

PACIFIC DISCOVERY



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IT'S AN OLD EDITORIAL CUSTOM to send off a new year and especially a new "decade" (see *Astronomy*, page 29) with predictions of things to come. Our own *Astronomy* Editor proposes the catchphrase "Stupendous Sixties." Indeed, the next decade will very likely see "Man in the Moon" come true, and perhaps even men to (if not from) Mars. Just staying on solid ground, we may also see stupendous developments ahead. A stupendous number of people, for instance, plain old Earth people. Our Conservation Editor will take a look at the coming crowd, next issue, by way of a Conservation Week (March 7-14) editorial. The certainty of surging mobs of eager consumers for the splendiferous gadgetry previewed in a Sunday supplement a couple of weeks ago causes much gleeful hand-rubbing among industrial tycoons. Well and good, for tycoons. Got to keep those wheels of industry turning. But personally I couldn't care less about turning the control of my car, driving to work in the morning and home at night, over to an electronic something-or-other embedded in the pavement. Or what have you? There's one thing, though, which I care a good deal about. Something I would like to relax in reasonable certainty of. These unique and marvelous aggregations of molecules and atoms that constitute *me*, and my wife, and my children, and my friends, and the persons who write articles for *PD*, and the craftsmen who put it through the presses, and you who read it, and the musicians and the painters and the poets I enjoy, and everybody I know or don't know, even the traffic cop who watches my speed at an intersection—all these, and all other special and individual and wonderful constructions of matter that constitute human beings (not to mention animals and trees and birds), these I would like to see hold together and function as nature intended for whatever span nature allots to each. I would like to be sure they will not be atomized, too soon and all at once, because someone in "control" of super-atomizers gets jumpy or careless with push-buttons. To help achieve this certainty, I implore you, if you haven't, to read a little book entitled *The Devil's Repertoire, or Nuclear Bombing and the Life of Man*. It is by a veteran English publisher, Victor Gollancz. Read widely in England, it was published here last year by Doubleday. The message it carries is by all odds the most urgent message, to all civilized nations and men, of our precise and immediate moment in history. Read and acted upon, by enough people for whom the future—the very present future indeed—has any meaning at all, it could cut the circuits of all push-buttons waiting the excuse for atomic war.

ACADEMY and *PD* staff members, and countless others who know the Director, Dr. Robert C. Miller, are repeatedly amazed, instructed or entertained by casual revelations of the contents of his mental attic. Now he reveals for us and posterity the infallible method by which he can locate the most obscure facts in its cobblestone recesses. And cartoonist George ("Grin and Bear It") Lichty graphically elucidates the method by which R.C.M. locates his pipe. . . . *New Zealander Reece Discombe operates out of Vila, New Hebrides as a Certified Motor Engineer, with undersea salvage a specialty; Pierre Anthonioz left the Condominium recently to take up his new duties as High Commissioner for the Islamic Republic of Mauretania. . . . *The center photo of sunset and surf in the Golden Gate, presented without title or comment, is the work of San Francisco photographer Pirkle Jones. . . . *With the present chapter we close the intimate glimpse of life Way Down Under by Patricia Bailey Witherspoon of Denver. . . . **PD*'s Nature Editor Dr. Arthur C. Smith announces his new professional location in his column. His home is in Richmond at the other end of San Francisco Bay. . . . **Astronomy* Editor George W. Burton is working on things-to-come for Morrison Planetarium. D.G.K.

PRE-DISCOVERY

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THE COVER



THE TWO SIDES of a medallion struck by the French Government to commemorate the Vanikoro Expedition of Reece Discombe and Pierre Anthonioz. (See page 4.)

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A JOURNAL OF NATURE AND MAN IN THE PACIFIC WORLD

Many happy returns, Ben

The Papers of Benjamin Franklin. Volume I: January 6, 1706 through December 31, 1734. Leonard W. Labaree, Editor; Whitfield J. Bell, Jr., Associate Editor; Helen C. Boatfield and Helene H. Fineman, Assistant Editors. Yale University Press, New Haven. 1959. lxxxviii + 400 pp., illus. in color and halftone incl. 24-p. facsimile of *Poor Richard*, 1733. \$7.50.

Of all great men of the Colonial and Independence period of our nation, the one with the strongest and most lasting personal appeal to the largest number of us is still undoubtedly Benjamin Franklin. So the appearance of the first of a projected series of *forty* volumes of his papers, to be issued during the next *fifteen* years is a notable event not only in the scholarly world but in the everyday world of most of us. The extent of this work may be astonishing to you, too. This first volume of Franklin papers, starting with the record of his birth on 6 January 1706 (corrected to 17 January for the new calendar) and ending with a *Pennsylvania Gazette* advertisement on the last day of 1734, contains more than three times as much material as the Smyth edition for the same period of Franklin's life. In other words, during the 52 years since that ten-volume compilation, a tremendous amount of new Frankliniana has come to light. More than half of all known Franklin papers are in the possession of the American Philosophical Society Held at Philadelphia for Promoting Useful Knowledge, and the Society has lent its full support to the present undertaking.

Browsing in this very handsome volume (which has been set in a beautifully clear type specially designed and cut for this work) for something to reflect on today, we may find (page 264) a draft "On the Providence of God in the Government of the World," an essay to the Junto. Franklin submits four possible views of the nature and modus operandi of the "Being of infinite Wisdom, Goodness and Power, which Being we call God," argues away three, and would bring us to the conclusion, "that the Deity sometimes interferes by his particular Providence, and sets aside the Events which would otherwise have been produc'd in the Course of Nature, or by the Free Agency of Man; . . . You acknowledge that God is infinitely Powerful, Wise and Good, and also a free Agent; and you will not deny that he has communicated to us part of his Wisdom, Power and Goodness; i.e. he has made us in some Degree Wise, potent and good; and is it then impossible for him to communicate any Part of his Freedom, and make us also in some Degree Free? . . . Much . . . might be offer'd to demonstrate clearly that Men are in some Degree free Agents, and accountable for their Actions. . . ."

A youthful Franklin perceived this humanitarian truth of free choice together with its clear-cut corollary of responsibility for the consequences thereof; firm always in his belief in a Divine Providence, he yet built the hard core of a long and useful life out of his devotion to the humanitarian ideal that men are given charge of their own destiny, to stand or fall by their own reasoning and action. This, I think, is Franklin's ringing message across the centuries to us. Were he alive today, he would be dedicated to the limit of his wisdom and influence to helping all men, of all nations, steer their way through the muddle of choices and conflicting interests out of which must come, if we live so long, some sort of ordered government of human affairs which will assure freedom from the haunting fear of the consequences of stupidity, selfishness, and irresponsibility. Franklin lives and speaks so widely among us today because, however high his head

and shoulders above most, his feet are down on the common road we all travel and his voice reaches us in everyday tones.
D.G.K.

Of whales and sails

The Open Sea: Its Natural History. Part II. Fish and Fisheries; With chapters on Whales, Turtles and animals of the sea floor. By Sir Alister Hardy. Houghton Mifflin Company, Boston. 1959. xiv + 322 pp., watercolor and line drawings by the Author, photographs by Douglas Wilson and others. \$7.50.

In the second part of his book about the life of the sea, Sir Alister takes up the fish and fisheries around the British Isles, and principally of the North Sea. It is a masterful treatment of a complicated subject, and no one at all interested in reading about the sea and its life or in learning about fisheries should ignore it because it does not directly concern our own ocean or our own fish. We do not know that much about our own fish. Sir Alister would be the first to protest that we really do not know a great deal about the North Sea either, but this is a matter of degree. Not only fish and fisheries, but the bottom life and the basic ecology of the sea are treated, and a fantastic picture is somewhat playfully drawn of a future when undesirable food consuming bottom organisms may be culled out and fish gathered with the aid of underwater tractors. One thing is certain, as the author says: marine ecology will increase in importance as the demand for sea food increases. As for Sir Alister's book, it will stand for a long time as the greatest feat of popularization in a field of knowledge where many have been called but few have been chosen. Indeed, there is nothing quite like it in the more austere professional literature, and scientist as well as armchair reader will find it an essential introduction to the life of the sea. The book is profusely and excellently illustrated.
J.W.H.

Surveyor of the Sea: The Life and Voyages of Captain George Vancouver. By Bern Anderson. University of Washington Press, Seattle. 1960. xii + 274 pp., 10 halftones, 5 maps. \$6.75.

With Captain Cook the grand era of the voyages of discovery reached its climax and a new era began. The same great explorer capped the one and opened the other. On Cook's second voyage, in the *Resolution*, which put to sea in 1772 with the *Adventure*, was a 14-year-old midshipman George Vancouver. The influence of the first truly scientific explorer-navigator, Cook, on his training and development, along with his native capacity for thoroughness and conscientious hard work directed by an excellent mind, well fitted the young R.N. career officer from Norfolk for leadership of one of the longest and most productive of all surveying voyages. This was the four-and-one-half-year, 65,000-mile cruise of the *Discovery* and *Chatham*, 1791-95, whose chief missions were to search for a Northwest Passage, survey the Northwest Coast of North America, and deal with the Spanish at Nootka Sound. Vancouver, Puget, Whidbey, Broughton, and all performed splendidly. The names they left on Northwest maps are tribute well deserved. Nor is the diplomatic role Vancouver found himself playing in Hawaii to be forgotten, as he forged links to annexation.

A Rear Admiral (Ret.) of the U. S. Navy, Bern Anderson has reassessed the character and accomplishments of George Vancouver for our time, with the aid of all available documentary sources including unpublished journals, and finds his importance and stature more considerable

(Continued on page 32)

How to Improve Your Mind

EVERYBODY, it may be supposed, would like to improve his mind. Even the most egregious egotist can hardly believe that his learning is so vast, his wisdom so profound, his memory so infallible, his wit so sharp, that no improvement is needful or desirable. The average individual—happily for his fellows—is not an egotist; he is likely to be an industrious plodder, painfully aware of his intellectual limitations, dissatisfied with the way his mental equipment functions, and pretty well convinced that there is nothing he can do about it.

There is something he can do about it. True, there is no magic formula that can produce brilliance out of stupidity, or genius out of mediocrity. But it is not necessary or desirable that everyone should be a genius. What is desirable is that everyone should—for his own pleasure and profit, and for the benefit of society—exercise his native intelligence in the most effective way.

It is just as easy to improve the mind as to improve the muscles, just as easy to cultivate the intellect as to learn to bowl or to play tennis. Not everyone can learn to play tennis well enough to win the Davis Cup, but practically anyone can learn to play well enough to enjoy himself and to give reciprocal enjoyment to his friends.

Considerable handicaps can be overcome. I have known a girl condemned to crutches and a boy partially paralyzed from birth, each of whom became a better than average tennis player who could provide good competition for the able-bodied. Practically all of us suffer from mental handicaps of one sort or another—a poor memory, inability to do arithmetic, a blind spot for languages, a habit of forgetting appointments, a tendency to say the wrong thing. It is necessary to recognize these handicaps and seek ways to compensate for them, just as a nearsighted man who wants to be a scholar will have to wear glasses.

Along with our handicaps, each of us has something that he does rather well—perhaps better than most. The problem then is that of the bridge player, to lead from strength but to have some stoppers in his weak suits.

"Improving the mind" is a phrase that is used in different senses. In the figurative sense it means reading good literature, or storing the mind with useful information, or learning a language, or studying mathematics, or pursuing an intellectual hobby, or reading *Pacific Discovery*. In a more literal sense it means taking memory courses, thinking up mnemonic devices, practicing remembering names or telephone numbers, or reading books on how to do creative thinking.

In the strictest sense, i.e., the biological sense, no one can "improve" his mind, just as—in the scriptural phrase—no one by taking thought can add a cubit to his stature. Mental, like physical, capacity is inborn and unchangeable. But one can improve *the way his*

mind works to the degree that a person of very ordinary talents may, with a well-disciplined mind, accomplish more than a person of great brilliance who goes off in all directions at once.

The Abbé Dimnet, in a charming and informative book entitled *The Art of Thinking*, has compared the human mind to a dusty attic, in which all sorts of odds and ends are stored. You keep turning up various things you didn't know were there, but the particular thing you are looking for is the hardest of all to find.

This is an excellent description of the human mind. It is an excellent characterization of my mind. But I maintain, and the Abbé Dimnet would completely agree, that this attic can be cleaned up. The objects can be organized in neat little piles, and the next time you go up there you can find what you are looking for.

I think the secret of the use of the mind—if there is any secret—is *organization*. What you want, out of all that you have known or heard or learned in your life, is to pull out the fact you need at some particular time.

This is difficult—this is important—and it can be learned.

When I was sixteen years old I attended a lecture in Uniontown, Pennsylvania, where I went to high school. The lecture was on "Improving Your Memory," and I recall all of the points that the man made. They were:

- Concentration
- Repetition
- Association
- Recall

I remember this speaker very well. He was a vigorous, intelligent, bald-headed man with a good sense of humor. I remember much of what he said, including his jokes. (He said, for example, "I am fond of quoting Shakespeare, but I hardly ever quote him twice in the same way.") He approached a serious subject in a light manner, which is doubtless why I remember his words of wisdom after more than forty years.

I cannot—alas!—recall his name. I would like to do him honor, but the name of this—one of my most important mentors—has slipped into oblivion. The reason is that, on that specific and important point, I did not concentrate, repeat, associate, or recall.

By "recall" I think he meant review. This is something like repetition, but with a difference. Repetition is going over a thing several times in the first place. Review is going over it again sometime later. Every once in awhile I re-read Lincoln's Gettysburg Address. Often when driving along the highway with nothing else to do, I recite to myself snatches of poetry from Tennyson or Browning, or passages from Shakespeare. This gives me pleasure, and if I have forgotten something, I look it up when I get

home. This practice gives me a considerable fund on which to draw, which has frequently served me in good stead in both speaking and writing.

I have always had difficulty remembering names. I have bolstered myself with every known mnemonic device, and still I don't do very well. If I meet a man named Peter, I will say to myself, "Peter—that means rock." But the next time I meet him I am likely to call him Stone. These things, when they happen, are best passed off as gracefully as possible. It's no good explaining to Mr. Wisecarver why you have called him Cutter.

If, after practicing concentration, repetition, and association, you still are having difficulty with recall, there are two assists that are cheaply and conveniently available—the manila folder and the 3 x 5 card. These are indispensable to anyone who has more than two ideas.

I keep a folder labeled "Ideas for Articles." Into this I slip notes of everything that occurs to me that I might possibly write about — things I think of while driving across the Bay Bridge, or while riding in trains or planes. Some of them are written on the margin of a newspaper. I hoard these things—perhaps because, when I was in high school, I had an

English teacher who herself essayed to write and who said to me rather sadly one day, "When you get older, you will find it difficult to think of things to write about." I never have.

When an idea begins to germinate—when I begin to think about it seriously—I pull it out of the "Idea" folder and put it into a separate one, under its own name. Into this folder goes everything I think of or can learn about that subject—random notes of random thoughts, sometimes a completed sentence or even paragraph, together with any relevant magazine articles or newspaper clippings. When you are thinking about a subject, your mind automatically gleans everything you come across that relates to it. The important thing is to *save* this material, and have it available when you want it.

This editorial began in the "Idea" folder, perhaps a year ago, and for the last three or four months has enjoyed the small dignity of a folder of its own.

Even more important than the manila folder is the 3 x 5 card, which—to me, at least—is more important than the electronic brain. I regularly carry a dozen or so 3 x 5 cards in my left-hand coat pocket. Every reference I look up in the library, everything I read or see or hear that I want to remember, goes on a 3 x 5 card. These cards are made to be filed; and with a fairly simple filing system you can pull out in a moment or two any reference or any memorandum that you want.

Memoranda of things to do I write on a card which I transfer to my right-hand coat pocket. A card in my right-hand pocket means something to be done. Since I also carry my pipe in that pocket, the system is practically infallible.

The value of the 3 x 5 card is something I learned from Professor Samuel Jackson Holmes of the University of California, who—unless he reads this—will never know he taught it to me. Professor Holmes, a man renowned for the breadth as well as the depth of his scholarship, tried valiantly to teach me many things—animal behavior, heredity, evolution. But the most important lesson of all I learned from observation. Professor Holmes always carried a small package of 3 x 5 cards in his pocket. They were mostly for library work, but I have no doubt they served him the additional useful purposes that they have me.

A teacher seldom knows the depth and permanence of the influence he has on a student, often by example more than by precept. I am pleased to pay this small tribute to Professor Holmes as he approaches his ninety-second birthday.

It is a common fiction that one's learning ability is greatest in early life and declines at a more or less uniform rate with advancing years. Recent studies of geriatrics have disproved this. Not only do elderly folks have a greater store of accumulated information, but they learn new things substantially as quickly as their juniors. This is not really a new finding, but a re-discovery of an old one. Cato is said to have taken up the study of Greek when he was eighty. In the cultivation of the mind, as in most other human pursuits, there is no substitute for experience. R.C.M.



VOYAGE TO VANIKORO

REECE DISCOMBE

&

PIERRE ANTHONIOZ

*The coral reefs of a tiny
Pacific island are at last yielding
to modern diving techniques
their long-held clues to the fate
of a famous French explorer*

The *Astrolabe* and *Boussole*, frigates of La Pérouse' "voyage round the world," 1785-1788. The windmill on the fantail of each ship was to grind wheat for bread—a modern seagoing invention in those days.



Brazil

1 August 1785 Brest

THE QUEST for fresh information regarding the circumstances in which Jean François de Galaup Comte de La Pérouse, born 1741 at Albi (Tarn) in France, was shipwrecked in 1788 on the outer reefs of the island of Vanikoro (Santa Cruz Islands) has always greatly aroused the interest of seafarers and historians. For many years deep mystery surrounded the apparent simultaneous shipwrecking of the two half-armed frigates *Astrolabe* and *Boussole*, since no survivor of the expedition was ever found. The natives of Santa Cruz have always maintained an excusable silence about the fate of the French mariners who were either drowned, killed, eaten, or else kept prisoners for years.

The voyage of La Pérouse was a scientific expedi-

tion of first importance. It had been fitted out and equipped with extreme care, and the results could have been comparable to those of the famous voyages of Captain Cook. La Pérouse means as much to the people of France as Captain Cook does to the people of Britain, Australia, and New Zealand.

The two ships left Brest on 1st August 1785, and having called at Brazil and Chile, subsequently visited Easter Island and the Hawaiian Islands, and later made the detailed exploration of the west coast of North America in accordance with La Pérouse's sailing instructions.

This work being finished, La Pérouse made his way to Macao, where he remained for two months, and thence to the Philippine Islands; he explored a



Chile

25 January 1788 Strait of LeMaire

part of the Japanese coast and the Kuriles, finally reaching Kamchatka. From there he set sail to the south, passed through the Samoan Islands and anchored at Botany Bay on 26 January 1788. Unfortunately he arrived there three days after Captain Phillip, in charge of an English expedition, had taken possession of Australia in the name of King George III of England.

In his last letters from Sydney addressed to the French Minister of the Navy, La Pérouse gave the itinerary he proposed to follow: after visiting the Tonga Group he intended to explore parts of New Caledonia, the Solomon Islands, the Louisiade Archipelago and to pass through Torres Strait so as to reach Mauritius in December of the same year. He

planned to return to Brest in June 1789. The French Revolution was then at its height. When no news of La Pérouse had been received the National Assembly decided in 1791 at the request of the Société d'Histoire Naturelle, to send an expedition commanded by the Chevalier d'Entrecasteaux in search of the expedition. Misled by information received on his passage of the Cape to the effect that the wreck had taken place in the Admiralty Islands, d'Entrecasteaux searched these islands in vain for survivors of the expedition. To crown his misfortune, the two frigates *La Recherche* and *l'Esperance* passed near Vanikoro but did not call, since d'Entrecasteaux had no reason to suppose survivors of the expedition would be found.

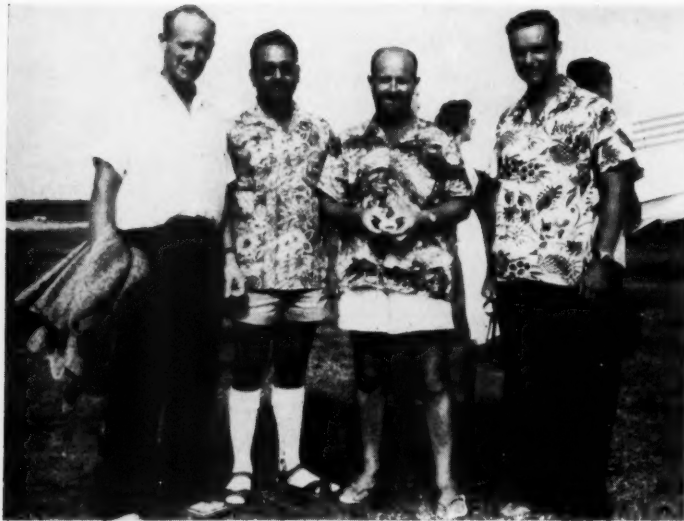
It was not until 1825 that another search expedition

under the leadership of Dumont d'Urville was organized; that commander, however, left France in April 1826 with very little information. On arrival in Hobart, Tasmania, in December 1827 he obtained news of the ill-fated La Pérouse expedition from a report of Peter Dillon, captain of one of the East India Company ships. The report which so interested d'Urville stated that during one of his voyages across the Pacific Dillon had on 20 September 1813 set down on the island of Tikopia, 120 miles to the east of Vanikoro, a Prussian, Bushart, his wife, and a Lascar, Joe, who had been shipwrecked, and whom he picked up at sea. Passing near this island thirteen years later he

decided to call, and found the castaway, Joe, still alive and in possession of a sword-hilt inlaid with silver. This was the first clue to be found in the mystery of the disaster which had overtaken La Pérouse.

Joe had been twice to the island of Vanikoro, and claimed that the wrecks of the two ships were still visible on the reefs. He stated that he had seen there two aged Europeans who declared themselves survivors of the ill-fated La Pérouse expedition. Dillon decided to go at once to Vanikoro, but bad weather and contrary currents would not allow him to anchor inside the lagoon, and he returned to Calcutta. There, having noted his report, the East India Company placed at his disposal a vessel, the *Research*, and considerable financial support to enable him to search for all possible evidence relating to the disappearance of the French expedition. The Company set aside a sum of 2,000 rupees "for the sole purpose of purchasing articles to be distributed as presents to the natives of Vanikoro," . . . a sum equal to the cost of fitting out a French expedition for a three-year cruise.

On his return this time to Vanikoro, September 1827, Dillon was more fortunate; he managed to anchor inside the reef and, with the help of the gifts, obtained a large quantity of articles from the wrecked ships of La Pérouse. These included bolts, chain links, saucepans, astronomical instruments, four bronze swivel-guns, a round-shot (4 kgs.), Spanish dollars, fragments of porcelain and chinaware, bottles and glasses, together with various pieces of lead, copper, and iron. He even obtained a carved plank decorated with the fleur-de-lys which was recognized as a part of one of La Pérouse's ships. Finally he obtained, for a very great reward, a large bronze bell bearing the legend "BAZIN ME FIT" (Bazin made me) which was



8 April 1786 Easter Island

▲ Members of the second expedition to Vanikoro, left to right: Dr. Haroun Tazieff, Belgium; Jack Barley of New Hebrides; author Discombe, New Zealand; Jacques Theodore, also of Belgium.

➤ Headquarters and wharf of the Kauri Timber Company on Vanikoro. The native village in the coconuts is Peu.



28 May 1786 Hawaii

California coast

June-October 1786



➔ Two cannons, ballast blocks, two anchors, and a cask of nails turned to oxide, leaving only their shapes where they had been.



recognized as having been cast at the Brest Arsenal in 1785. On his return to Calcutta, the East India Company authorized his going to France, where he was presented to Charles X who awarded him the Cross of Chevalier of the Legion of Honor, a grant of ten thousand francs, and a pension of four thousand francs yearly, for life.

After hearing this story, d'Urville on 6 January 1828 sailed from Tasmania for Vanikoro. There he found it hard to get information from the natives as the money at his disposal was too modest, and because the people of Vanikoro, who had good reason to have a troubled conscience, had learned through contact with Dillon that the newcomers were fellow-countrymen of the shipwrecked men. Eventually, however, he managed to obtain a guide who led him to the actual place where the *Astrolabe* was wrecked, in the passage facing the village of Ambi, which still bears the name

the appearance of a passage, the center of which contained a vast plateau of coral covered to a depth of two or three meters, but on which the sea did not break, as on the two adjoining reefs.

"Everything leads us to believe," he says, "that La Pérouse . . . bore towards Santa Cruz in accordance with his instructions. When approaching these islands he no doubt thought that he would be able to keep going during the night, as he had done so often, when he unexpectedly fell on the terrible reefs of Vanikoro, of whose existence he was entirely unaware. Probably the leading frigate (and the articles brought back by Dillon have given rise to the thought that this was the *Boussole*) entered the breakers and was unable to get out, whereas the other had time to get to windward and make out to sea. . . ."

But perhaps realizing that the first vessel was irretrievably lost, the *Astrolabe* may have attempted to pass inside the reef, where it would have been easier

"Wreck Passage" (False, or Wreck Passage, on English charts).

He then noticed that the opening in the reef had

to pick up the shipwrecked sailors. Possibly it was while going to the assistance of the *Boussole* that the *Astrolabe* met the same fate.



Skin divers examine an *Astrolabe* anchor after the dynamiting which blasted away the coral crust that had grown around it.

"... That, without doubt, was the reason for the loss of the second ship. The very sight of the place where she rests gives fresh support to this opinion, as, at first glance, one would expect to find a passage between the reefs. It is therefore possible that the French on the second ship had attempted to penetrate this opening by going through the breakers, and that they only discovered their mistake when the loss of their ship took place. . . ."

No more was heard until 1840, when the French warship *Bruat*, stationed in the Pacific, went to Vanikoro and salvaged cannons and anchors which were sent to La Pérouse's home town, where they can now be seen at the base of a monument erected to the memory of this great explorer. Other expeditions followed to seek more information. One, in 1938, included three Frenchmen, Broise, Martinet, and Klein, who sailed by cutter to Vanikoro, and spent considerable time searching likely spots suggested by the natives of the locality. They found no trace either of the *Astrolabe* or the *Boussole*, but marked their visit by erecting on a rock emerging from the reef to the north of the passage a cross, which still remains, and which has on several occasions been repaired by vessels of the French Navy. On a visit two years ago, a commemorative marble tablet was placed at the foot of the monument.

In 1956 the French Navy, anxious to relocate the remains of their gallant countrymen, fitted out an expedition and sailed for Vanikoro on the patrol ship *Tiaré*. After an unsuccessful search lasting several days, and having lost their diving equipment, they returned to base.

An English trader, Mr. Fred Jones, who has spent some thirty-five years at Vanikoro, has searched on his own account, and thanks to his very good relations with the natives, collected over the years a

number of items from the wrecked ships which had been thrown up on the beach by the tides, or had been found in the few remaining villages of the island. I have seen a Spanish dollar, dated 1784, which was in Mr. Jones' possession.

First Expedition

M. PIERRE ANTHONIOZ, until recently French Resident Commissioner in the New Hebrides Condominium, visited Paris in 1957. I suggested to him that we might organize an expedition to Vanikoro, and asked him to look up Dillon's references to the position of his discovery. M. Anthonioz consulted the Bibliothèque Nationale and original charts drawn in 1828 by Lt. Gressien, an officer of d'Urville's expedition, which showed the spot where d'Urville had found incontestable proof of the wreck of the *Astrolabe*, that is, on the plateau of coral reefs situated in the middle of Wreck, or Ambi, Passage.

On his return from Paris an expedition was formed. From the information gathered, it seemed that the principal object must be to get as much diving equipment and as many underwater specialists as possible. It was decided to travel to Vanikoro by the *Don Quijote*, a fast 60-ft. twin-engined launch, placed at our disposal by the Condominium Government of the New Hebrides. The party consisted of Jack Barley, Captain of the *Don Quijote*, who also has had underwater experience; M. Anthonioz, a very capable swimmer; and Robert Charles, a French citizen, and myself, a New Zealander—both of us having had many years of underwater diving experience.

Our equipment consisted of six sets of aqua-lungs, compressors, reserve bottles of air, underwater explosives, crowbars, and necessary swimming apparatus. We left Vila on 14 March 1958, and proceeded to Espiritu Santo, 180 miles north, en route for Vanikoro. After taking on fuel at Santo, and passing



"Bashee" (Batan) Islands



The Russian coin of 1724 may have been picked up along the Czar's East Asiatic coast.

Marianas

through the Banks and Torres islands, we arrived at Vanikoro on 17 March.

Vanikoro is the most southern island in the Santa Cruz group, where the historic sea battle between the Americans and Japanese was fought in 1942. It is administered by the Government of the British Solomon Islands Protectorate. Vanikoro is over 400 miles due north of Vila, and 400 miles south of Guadalcanal—where the Americans first halted the Japanese advance south. The estimated population of the island in the time of La Pérouse was 3,500; the present native population has now dwindled to about 100. The only industry on the island is the cutting of Kauri logs which are shipped to Australia by the Kauri Timber Company. About 12 Australians, and some 150 natives recruited from outlying islands, are employed in the industry. Owing to the amount of rainfall, the vegetation is abundant. The island is surrounded by very dangerous coral reefs, which are only passable in three places. La Pérouse met his fate trying to negotiate one of the narrow passages of the reef, lying a mile from the island. Between the island and outlying reefs are numerous coral heads, which are treacherous to navigation and make night navigation impossible.

After making anchorage at Peu, where the head office of the timber company is situated, and formalities over, the wind being from the west we decided to begin our search in the passage which was the nearest to Peu, i.e., Bruat Pass. Having swum the reefs and across the passage without finding any sign of a wreck, we decided to go to the spot which interested us most of all, that is, Wreck Passage. We again swam along the reefs and across the passage, finally exploring in detail the coral plateau indicated by

which had undoubtedly been part of a vessel sunk long ago. Unfortunately at about 3 P.M. the tide changed and took us out to sea, and it was only with the greatest difficulty that we were able to get back to the *Don Quijote*. For half an hour we lost ground and were finally rescued by a rope and a buoy thrown from the ship.

That evening, Mr. Filewood, manager of the Timber Company, to whom we had described our dis-



One of the lead ingots, used for casting musket balls, the marks on which were a critical aid in identifying the ship.

d'Urville as being the place where he had recovered wreckage from one of the ships.

Following my experience of shipwrecks on coral reefs, Charles and I swam on the inside of the reef, expecting to find remains there, rather than on the outside. It was at about 1 P.M. that day that we noticed, in three meters of water, coral which had a different form and structure from the rest. Looking closer, we saw a shiny object on the bottom. After diving I could see what appeared to be a coil of about 20-gauge brass wire, some nine inches in diameter. At this stage I called to the rest of the party who were swimming on the outer reef. Further investigation by Mr. Charles and myself revealed seismetrical shapes which proved to be lead ingots and iron ballast blocks very thickly encrusted with coral.

We started breaking the limestone crust with a crowbar, and after about an hour's work there appeared some pieces of wood, lead, and cast-iron,

covery, offered to put at our disposal the company's raft which was used to transport kauri logs, together with a powerful tug, *Toby*, which would allow us to work under the best conditions. We gladly accepted this most welcome assistance.

The following day was spent in blowing up large blocks of coral with dynamite, laying bare an ever-increasing accumulation of strange objects composed of wood or metal, which seemed to have been in the central hold of the *Astrolabe*. During the course of this day we collected three pigs of lead, each weighing 80 kgs., and on which were the figures 41, 36, etc., the letter "A" and the mark



We also found a packet of nails, plates of cast-iron, copper wire, some buttons—doubtless of gold—and finally some fragments of white porcelain. Towards the end of this day we noticed a large anchor, but the change of the tide, although later than on the previous day, obliged us to return to the anchorage.

The search continued next morning and brought to light four anchors stowed stock to crown (i.e., head to tail) one on top of the other. One was covered by a crust of coral about 2.5 meters thick and three meters wide, and to this the raft was moored. The coral was so hard that the wind getting



Japan

Formosa

up in the middle of the day parted the 1.5-inch wire hawser which we used as an anchor rope. It tore away part of the raft, but didn't move the coral head. Early in the afternoon we managed to lift one anchor with the aid of four 44-gallon drums, which were submerged and then filled with air by means of an underwater compressor. Finally, at the end of the third day, we brought to light a block of metal which resembled a cannon, about one meter long with a hoop on each end. This might have been a howitzer, or a swivel-gun, of about 150 mm. caliber. Unfortunately it was not possible to raise it before the tide turned.

We stowed the salvage on the *Don Quijote*—the anchor being placed in the after hold. This weighed about 800 kgs. and hindered our steering. Having warmly thanked our English and Australian friends at Vanikoro, we put to sea and headed back to Vila.

The 1842 edition of d'Urville's *Voyage Around the*

World indicates that our discovery was almost certainly genuine. Although he had not been to the scene of the wreck, Dillon recounts the version of the natives. According to them, one of the ships went ashore at Vanou, and the other at Peu. The important information, however, is in the report of M. Jacquinot, to whom d'Urville entrusted the work of fixing the actual site of the shipwreck. After many difficulties M. Jacquinot managed to get one of the natives to accompany him to the passage. To quote d'Urville:

"... The chain of reefs which surrounds Vanikoro extends for two or three miles outside Paiou [Peu] and Ambi, sometimes coming close to the coast, sometimes a mile distant. In a sort of passage through the breakers the savage stopped his canoe and with a gesture indicated the bottom. The Frenchmen looked, and at a depth of twelve to fifteen feet they were able to see here and there, encrusted with coral, anchors, cannons, cannon balls, and numerous sheets of lead. This sight dissipated all their doubts. On the points of this coral shelf one of the ships of La Pérouse had been lost..."

But the essential point is in the following paragraph:

"... All the woodwork, buffeted by the waves, had disappeared, only the metal, more durable and more resistant, remained. The position of the anchors would give rise to the presumption that four of them had gone down with the ship, but that it had been possible to drop the other two. Moreover, from the aspect of the surroundings it would seem that the vessel had gone into this passage to get inside the breakers, that it had gone ashore and had been unable to extricate itself. Some of the savages declared that this was the ship whose crew had landed at Paiou and had built a small vessel; the other ship, having gone ashore outside the reef, was completely swallowed up by the sea..."

According to d'Urville, M. Jacquinot, and later M.



PACIFIC DISCOVERY

Gulf of Tatar

Sakhalin

Guilbert, succeeded in raising from the coral an anchor of about 1,800 lbs. No mention is made, however, as to whether this was one of the four reserve anchors or one of those which had been dropped. They also recovered:

"... a short cast-iron cannon, calibre 8, heavily rusted and covered with a crust two inches thick. A bronze swivel-gun, a brass blunderbuss, a pig of lead and also a large sheet of the same metal, some fragments of porcelain, completed the salvage gathered over a period of forty years..."

It should be added that after 170 years the layer of coral has almost quadrupled, without taking into account the head to which we had moored our raft.

Our expedition met only partial success. We brought to light only a small portion of the wreckage,



embedded in the coral, and in this we found pieces of blackened wood, resembling beech. We examined the reef carefully over a radius of 100 meters and found much material from the ship, covered over by the growth of coral polyparies.

Second Expedition

ON 2 MARCH 1959, I received a letter from the High Commissioner of Mauritania, M. Pierre Anthonioz, asking me if I would join another expedition to Vanikoro to salvage more of the remains of the *Astrolabe*, and to seek information on, and if possible try to locate, the second ship, *Boussole*, of the ill-fated La Pérouse, and to make a film of our discoveries. Members of the expedition were to include Jack Barley and Charles and myself from the first expedition. Unfortunately Anthonioz and Charles were not able to join us, and were replaced by Dr. Haroun Tazieff, a well-known volcanologist from France, and Jacques Theodore from Belgium, who is a noted underwater camera expert.

As everyone concerned was centered in Vila, New Hebrides, we were fortunate in having the Condominium vessel, *Rocinante*, placed at our disposal by the French and British Resident Commissioners, Mons. C. Favreau and Mr. J. S. Rennie. Preparations were then made for loading all our underwater equipment, which consisted of six sets of aqua-lungs, two compressors for recharging aqua-lung bottles, four underwater cameras, underwater floodlights and an electric generator to work the floodlights, cylinders of compressed air, bedding, food, etc. Extra fuel was put aboard, and the *Rocinante* left Vila on Saturday, 30 May 1959, for Vanikoro, via Santo.

We arrived at Vanikoro on Thursday morning, 4

6 September 1787 Kamchatka

Aleutians

since the wind, tides, and our equipment did not allow us to collect more. After each fresh explosion, once the thick cloud of debris had disappeared, we were able to see the large quantity of material still

June. The *Rocinante* is a 48-ft. vessel of 26 tons, with a cargo capacity of eight tons. Both the Captain, M. Yves Guenet, and the engineer, M. J. Rossi, helped to make the expedition a success.

PHOTOS FROM LEFT TO RIGHT:
Jack Barley locates a coil of wire. Covered with coral, such objects are hard to distinguish from the bottom.
A ring of an anchor; a canvas bag of cannon balls 1.25 inches diameter; a 6.25-pound cannon ball; ballast.
A bag of 1.25-inch cannon balls and one 6.25-pounder, out of the water.
One of the anchors on the fantail of the Condominium vessel *Don Quijote*.



JANUARY-FEBRUARY 1960

Gulf of Tatar

Sakhalin

On our arrival we were met by Mr. and Mrs. Filewood, who, on the previous expedition were most helpful, and who continued to be so. Formalities over, we moved our equipment from the ship to the house kindly lent to us by the Kauri Timber Company for the duration of our stay. We then decided to go to the spot where we discovered the *Astrolabe* to see if anything had eventuated since our blasting of the wreck. Since the seas were calm and the weather good, we decided to film the wreckage. There was little change in the condition of the wreck, except that some of the loose rubble caused by dynamiting had been washed away. Owing to rough weather next day we were unable to film or dive, so paid a visit to the memorial cross, which we found had been severely buffeted by the very heavy seas which Vanikoro had experienced through the year.

On Saturday, 6 June, we began our search for further information on the whereabouts of the second ship, *Boussole*, and the fate of her crew. We decided to seek out the oldest native inhabitants of the islands and to question them concerning their knowledge of the fatal expedition. Luck was with us when we found an old man named Wiewo, aged between 70 and 80 years, the oldest man on the island, who was visiting Peu, our headquarters, at the time. After tactful questioning for about two hours he informed us that his father had told him, when he was a small boy, how the French ships had been lost while entering the reefs. He agreed to take us to the village of Tanema, where he was born, but which had been abandoned for about 60 years, and where he claimed there were crude graves where his forefathers had buried some of the crew of the *Boussole*. After a run of one and a half hours along the coast in the *Rocinante* we an-

chored off the former site of Tanema, and made our way through mangroves and jungle to the site of the village. The only signs remaining of the former village were the conch shells which the natives had placed on the graves of their dead, together with the bones and coral fences which the wild pigs had long since rooted out. About a hundred yards further on through the jungle, Wiewo pointed out a large heap of stones, under which some of the murdered seamen of the *Boussole* were supposedly buried. Wiewo's theory of the fated expedition was that the *Boussole* tried to enter the Makulumu passage and became stuck fast to the *Boussole* reef. The cannibal natives, taking advantage of the situation, apparently captured and killed the entire crew. Those killed were eventually washed ashore among the mangroves, where they were finally covered with stones. The fate of the captured men can well be imagined, although it was not admitted by Wiewo. The *Boussole*, he



PHOTOS FROM TOP TO BOTTOM: Vanikoro's oldest, Mary and Wiewo, who gave us valuable information handed down from La Pérouse' time; Wiewo showing us the place of rocks where he claims his ancestors buried some of the *Boussole*'s crew; Mr. Filewood looks at the remains of the monument we located.

claims, re floated herself from the reef and drifted north to become finally wrecked on Bayonnaise Point on Tevai Island.

During the next four days, the 7th to the 10th, we concentrated on the wrecked *Astrolabe*, using explosives to blast away heavily encrusted coral. After every charge, various items of interest such as cannon balls, anchors, iron rods, brass wire, broken crockery and bottles, buttons, kegs of nails, etc., came to light, all of which provided excellent material for filming.

On Thursday, the 11th, the weather was again too rough for work on the wreck, so the timber company's tug, *Toby*, took Jack Barley and myself to the north to examine a smaller reef which the natives believed was a sunken ship completely encrusted with coral. After a closer examination by diving, this was proved untrue.

Exploration of Naun-ha Island, about half a mile further on, revealed a piece of iron 6 feet long, 1 inch in diameter, heavily encrusted with coral and of the same texture as the iron previously taken from the *Astrolabe*. More information from the village of Vanu revealed that crockery had been found on the beach after heavy seas. Following up this theory, we set natives to work digging in the area, and after several hours some pieces were unearthed, the design of which coincided with that of the crockery found on the *Astrolabe*. The pieces of crockery and the iron found on Naun-ha Island indicate that Dillon's theory, that the *Boussole* was wrecked on Vanu, may be correct.

From the 12th to the 15th, with the use of the barge kindly lent to us again by the timber company, we anchored over the scene of the *Astrolabe* wreck, and with several boys began hauling in various items

knives to clear the undergrowth. Unfortunately, owing to shortage of time, we were unable to tackle it.

On Saturday, the 20th, we decided to try and locate the monument which was erected by Dumont d'Urville on Manevai Island off Vanikoro's northeast side, but before reaching it we stopped at Mausoleum Bank and investigated further the heap of stones in the clump of mangroves which after our last expedition revealed an ancient copper coin apparently placed there as a good luck token by d'Urville. However, as Mausoleum Bank Island was not the location indicated in d'Urville's book, we crossed to Manevai Island and found what could have been his monument. As time was running out, the area was not fully explored, and we returned to Pea.

Since the cross erected on the outer reef was being badly damaged by rough seas, we decided to erect a new monument in the village of Pea in honour of La Pérouse. After the necessary arrangements had been made for the site, we constructed a monument from some of the materials taken from the *Astrolabe*. The plaque was constructed from lead sheeting, and inscribed as follows:

à	To
LA PEROUSE	LA PEROUSE
et à	and his companions
Ses Compagnons	marines and scientists
Marins et Savants	1788
1788	erected 27th June, 1959
eleve 27 Juin, 1959	on lead rescued from
grave sur plomb remonte	Astrolabe wreck
de lepage de l'Astrolabe	

Varau, Tonga

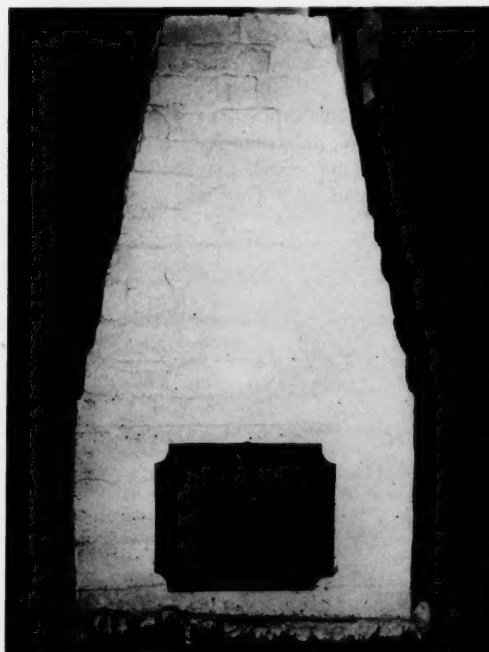
Tongatabu

27 December 1787

which we had uncovered through dynamiting. These included anchors of two sizes—the largest being 10 feet long and weighing approximately three quarters of a ton. Ballast blocks of about 60 pounds each, and lead ingots—doubtless used for melting down and making shot for the crew's muskets—were also found, as well as some pieces of lead with markings similar to those found on the first expedition.

Opposite the wreck of the *Astrolabe* at Ambi, on the side of a ridge overlooking the whole of the southern coast of Vanikoro, is a clearing surrounded by jungle, which the natives claim was the lookout used by survivors from the *Astrolabe* for passing ships. A native guide and myself landed as near as we could to the clearing and proceeded to cut our way through the crocodile-infested mangroves and swamps, up the ridge to the clearing, which we found covered by fern about five feet in height. To make a closer investigation would have required a number of men with

The new monument we built at Pea, with a plaque of lead taken out of the *Astrolabe* wreck, was unveiled by Commandant de Brassart, French chief in the Pacific. The bilingual legend is shown in type, above.



31 December 1787

We made a return trip to the scene of the wreck, where continued dynamiting revealed three cannons of about three quarters of a ton each, and which we brought to the surface. In addition, more anchors were found, and a Russian coin dated 1724, stamped "Peter I" on one side.

There still remained one village, Boma, where we had not sought information. There, Dr. Tazieff and I met the oldest native woman on the island, who, although rather reluctant to talk, claimed there was a ship wrecked in the vicinity of Naun-ha Island. We also learned that the natives have a song of the wrecked ship, but to extract the words of the song is most difficult and it would be necessary to live in the village for several days to gain the confidence of the natives.

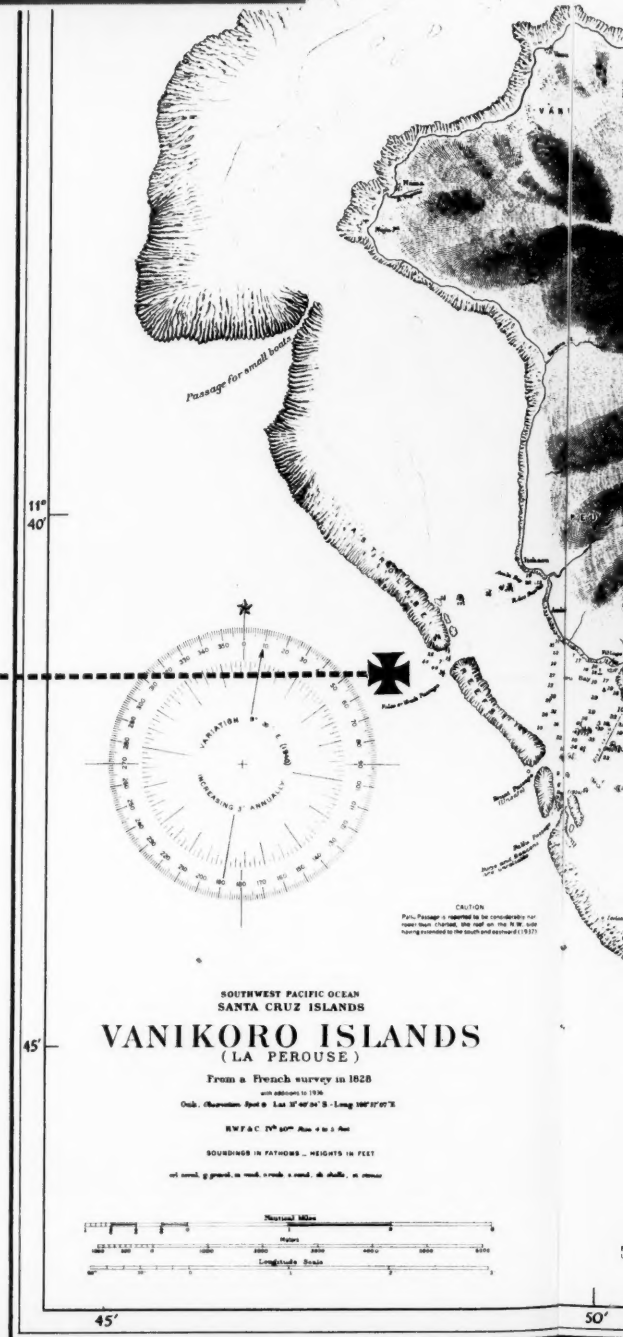
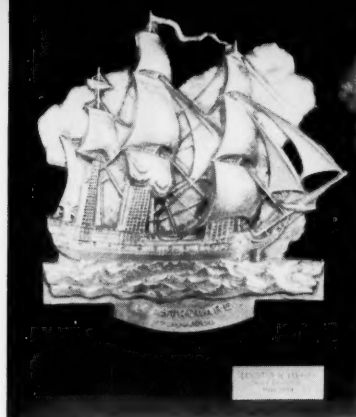
As the *Rocinante* was too small to bring the material from the *Astrolabe* back to Vila, Dr. Tazieff radioed the French Resident Commissioner, to ask whether the French patrol ship, *Tiaré*, could proceed to Vanikoro to assist. The *Tiaré* duly arrived on Thursday, 25 June, and we began loading the following items which had been salvaged from the wreck: five anchors, three cannons, pieces of wood, barrels of nails, cannon balls, lead ingots, ballast blocks, sheets of lead, iron bars, brass wire, barrels of a substance that could have been gunpowder, etc. These will be shipped to France as museum exhibits.

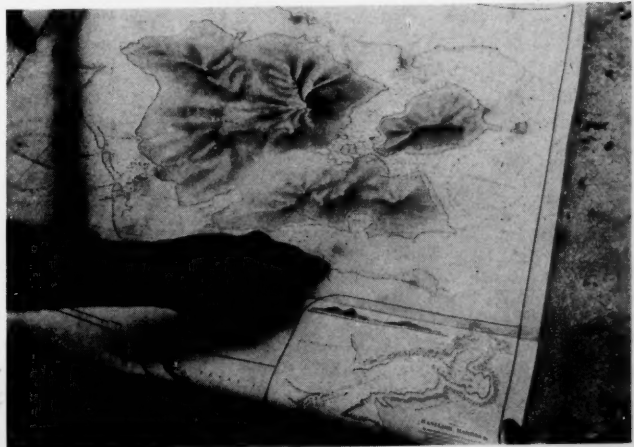
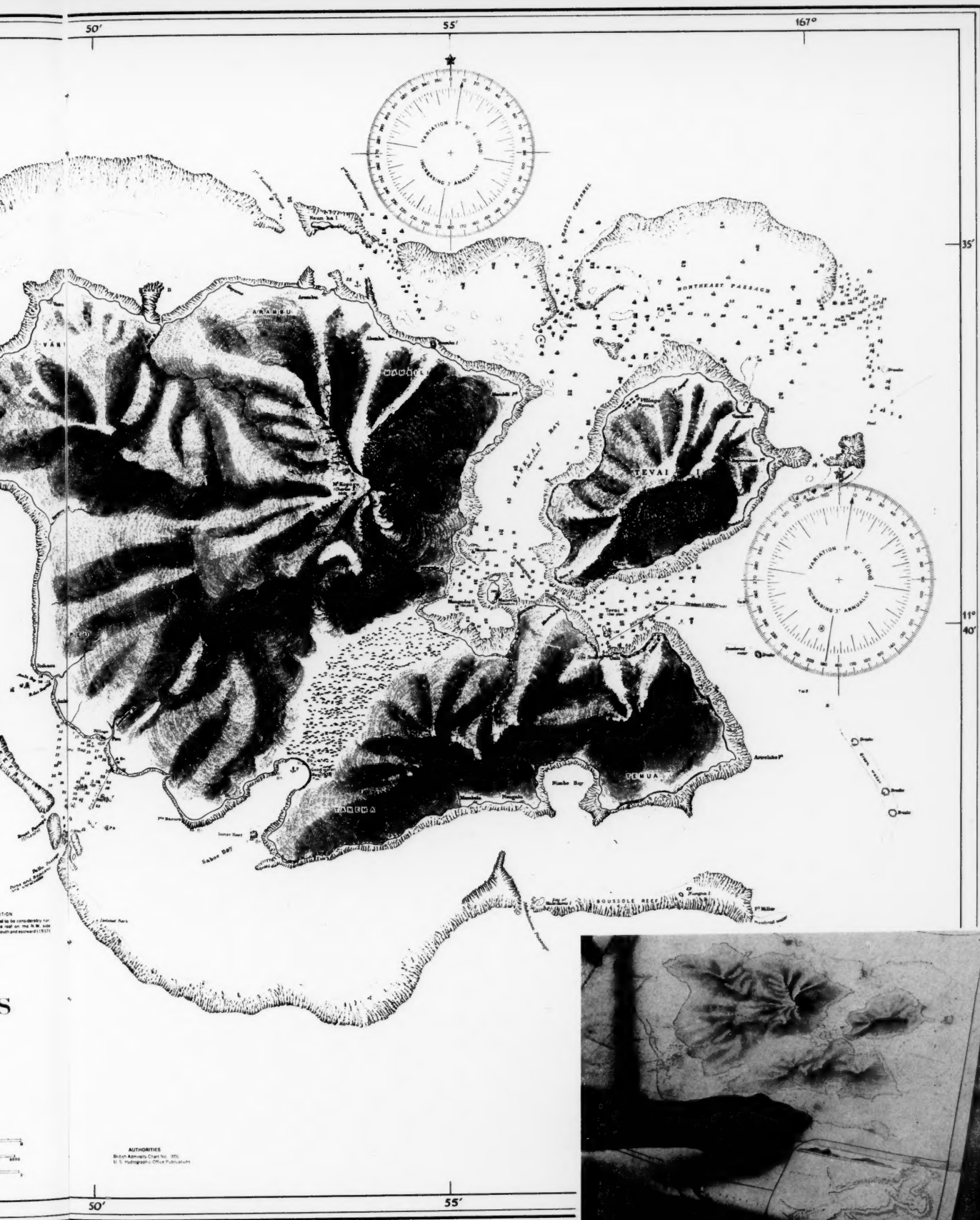
On Saturday the 27th, with a naval guard of honor and an eleven-gun salute, the monument was unveiled. Speeches were made by Commandant de Brasseur, M. Favreau, and Mr. Filewood, the latter on behalf of the High Commissioner for the Western Pacific. After the ceremony we embarked on the *Tiaré* and headed back to Vila, after a most enthrall-

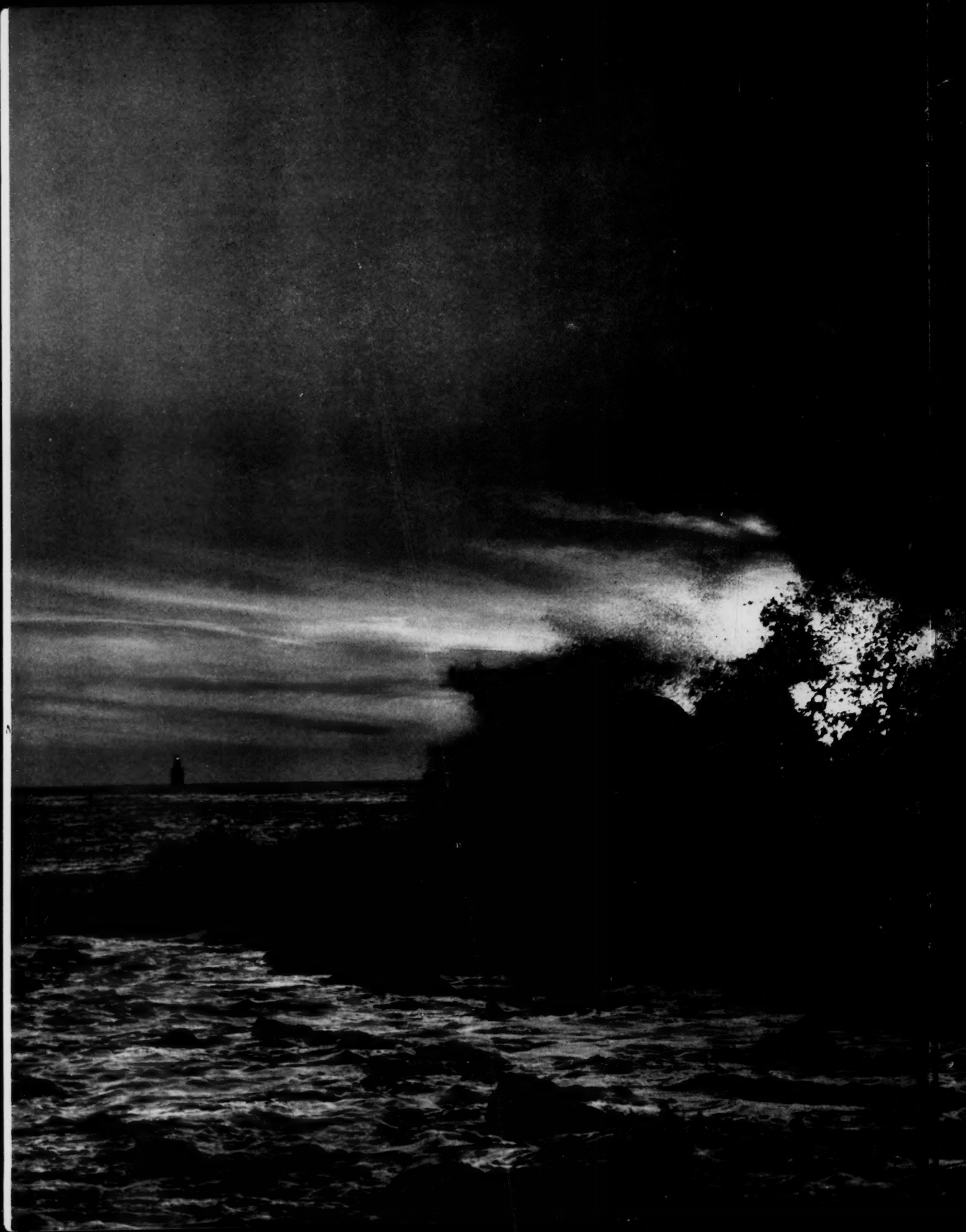
ling and fruitful expedition lasting about one month.

After taking part in both expeditions, and with the information and knowledge we have accumulated, it is my view that a third expedition should be sent to Vanikoro. If this expedition were equipped with modern electronic detection devices, the task of finding the remaining vessel, the *Boussole*, would be greatly facilitated.

Part of U.S. Navy H.O. Chart No. 1979, reduced, with borderline modified.
This is based on the British Admiralty chart on which ... (INSET) Wiewo points to Boussole Reef and the spot where, he said, its namesake frigate struck.
INSET (UPPER LEFT) The 12x18-inch marble plaque which the French Government awarded the principal author for his actual finding of the remains of the *Astrolabe*. The wording beneath the ship is "L'Astrolabe 1785-1788" and on the plate (lower right): "Expedition de Vanikoro, Reece Discombe, Mars 1959."











LIVING ALONG THE MACHLAN

Patricia Bailey Witherspoon

IT IS always nice to return to visit old friends. On two previous expeditions my father had carried on field work on the Wilkinson Station near Benetook in northwestern Victoria. Ray Wilkinson and his daughter Norma, enthusiastic naturalists, were looking for us. They graciously served the customary tea and cakes and Norma, a blonde lass in her twenties, told me something of her life on a sheep station. As a student she daily rode twenty miles on a bicycle to a little schoolhouse; when her mother died, Norma took over the housework as well as the outside chores. She and her father were doing all their own work on the 15,000-acre station. They had 1,000 merinos, an average of fifteen acres to a sheep. Their place was in the seven-inch rainfall belt, but seasons varied and the previous one had been abnormally dry with a consequent shortage of food for the stock.

We were shown through the nearby mallee forest.

Apparently the drouth had not affected the wild animal life for there were mobs of red kangaroos, and birds were exceedingly numerous. There were beautiful ring-necked, blue bonnet, and mulga parrots, and the strangest of all was the *Podargus* or frogmouth, a member of the nighthawk family. Norma showed us a fragile nest of the latter in the crotch of mallee eucalypt.

The brooding female was so well protected by color and pattern that we did not see her for some time though we were standing within a few feet. She escaped detection by remaining absolutely motionless, with eyes closed to slits and beak thrust upward at an angle of 45°.

When I put my hand up to within inches of the old bird she flew to the next tree landing on a limb, perching lengthwise as our nighthawks do. Now she resembled a projecting stick, an excellent example of

Photos by Alfred M. Bailey

protective coloration. We examined the nest and there was a baby looking just like its mother, for the young too stayed absolutely still with its bill pointed up and eyes tightly closed. But when Norma held the youngster in the palm of her hand it lost its original identity to take on the appearance of a fluffy owlet.

The last of our series of motion picture programs was given at Mildura in the northeast corner of the state to a friendly audience. This thriving town proved to be a bustling and prosperous farming center with 40,000 acres nearby under cultivation made possible by irrigation waters from the Murray, Australia's largest river. For much of its length, the Murray forms the boundary line between Victoria and its neighbor state to the north, New South Wales.

The red lands bordering the river near Mildura were like those of the sheep stations to the southward, but through irrigation, we were told, thirty cultivated acres planted to grapes, pears, apples, oranges and grapefruit gave a better living than 3,000 dry acres devoted to the sheep industry.

Blue sky and sunshine, the first seen in five days, brightened our prospects for photographic work. Nature-minded friends, Mr. and Mrs. H. Thomas whose home is surrounded by an orange grove, showed us one of the most beautiful of all Australian birds, the black-backed blue wren. The little female had a nest in a thorny scrub and occasionally the male would dart in to feed her as she incubated her eggs. Along about 3:00 while my father was taking pictures, Mrs. Thomas brought him cakes and tea, the first and only time in his many years of field work that he has been so pampered.

Mildura is a pretty little city with palm trees and flowers everywhere, the waters of the Murray making possible this oasis. We enjoyed our stay at the Grand Hotel with its lounge and crackling fire, and did not at all object to the cost of our accommodations, two rooms with private bath and six meals—all for ten dollars!

My most treasured experience of all the Australian trip was visiting a sheep station in the outback of western New South Wales where we were guests of Mr. and Mrs. Sandy Anderson with whom Dad had visited on previous occasions in '49 and '52. It was a day's drive from Mildura, first crossing the Murray into western New South Wales, and passing through extensive mallee scrub country and out again into open areas where sulphur-crested and rose-breasted cockatoos circled in flight.

About noon we came to the sleepy little western town of Balranald. As in all Australian communities typical wooden verandas extended over the sidewalks to give pedestrians protection from the pressing summer sun and to keep off torrential spring rains. Half-breed aborigines sat motionless under the shelter and the peaceful inactivity reminded me of some of the villages in our own Southwest.

Mid-afternoon found us in Hay, the nearest community to the Sandy Andersons, yet forty miles away, and for tuppence we called them on the phone from the chemist's. We bumped over rutted red sand roads, so bad that we preferred the open prairie, seldom exceeding 35 miles an hour and more often cutting down to 10 with fine sand permeating through closed windows.

Conclusion of "KOALAS, KOOKABURRAS, AND KANGAROOS"

← The Lachlan River winds through southwestern New South Wales to join Australia's main stream, the Murray.

→ The podargus is designed to look like a shaggy-barked projection on a eucalyptus limb. A baby bird is well hidden beneath the wing of the "frozen" mother.



Off in the distance was a line of green trees, which Mr. Pescott recognized as the winding Lachlan River which gives life to this flat dry range grown with salt-bush. It was in that wooded area we were to spend several wonderful days with the Andersons on their sheep station of 50,000 acres, photographing bounding kangaroos, observing curious emus and thrilling to flocks of rose-colored galahs filling the sky in aerial flight.

We left the open prairie and the road wound between tall eucalypts. Waiting along the wooded trail was Sandy Anderson and his kelpie dog; and soon we were at Thelangrin Cottage where our charming hostess, Mrs. Anderson, immediately made us welcome, and served us with tea and cakes before a cozy fire. The cottage was an imposing 30-year-old English home with 22 rooms, each with its own fireplace—seven of which during our stay were continuously fed with mallee roots, to break the chill. The cottage, nicely situated on high ground, was close to the Lachlan River, a slow-moving, meandering stream at the time of our visit; but in the spring, we were told, the waters often rampage and overflow the flat country for a width of 60 miles.



< T
wren
loveli

‡ The meandering Murray forms part of the Victoria-New SouthWales boundary line.



◀ The black-backed blue wren is one of Australia's loveliest small birds.

➤ Flocks of parrots, such as these sulphur-crested cockatoos, and the rose-and-gray galahs, are one of the most unexpected and charming sights of outback Australia.



When such rains come the station people are isolated for weeks at a time. The Andersons, used to fighting the elements, prefer the torrential rains to the hot dry summers when temperatures often climb to 120°, and one's hands are burned by carrying work tools. Apparently April is the best month when winter "lazy winds" go through you instead of round.

Dust storms are often severe and in 1942 a terrible one occurred. First there was an unusual stillness—a dead calm. Looking from the window, Sandy saw clouds rolling toward the house, but before he could reach the phone he was unable to see his own hand. All night the Andersons lay on the floor with their faces buried in wet clothes to keep from suffocating. The following morning the destructive storm was over. Most of the livestock was dead.

The Andersons' station is many miles from their nearest neighbors and there are discouraging years of drouth, as well as flood, but there are many compensations. As people do in out-of-the-way places, the Andersons produced much of their own living—lambs, chickens, eggs, fine redfin perch from the Lachlan and an irrigated orchard which gave them an abundance of oranges, grapefruit, lemons, and limes.

Such food! Starting with lamb chops and eggs for breakfast, our days seemed a procession of continuous eating. Early in the morning Sandy would be at the chopping block carving off the most delicious lamb

chops or roasts, while strolling nonchalantly nearby, not the least concerned—for he would never suffer such a fate—was "Wee Willie Wood," Mrs. Anderson's pet merino ram. Wee Willie's favorite diet was cigarettes and so prodigious was his appetite that he had to be rationed to just a few each day. One year when his heavy fleece coat was removed by the shearers, Willie felt so ashamed that he hid behind a box for two days.

The biggest surprise to me came the first evening. After bathing, and dressing—the women in their party frocks and the men in white shirts, coats and ties—cocktails were served in the den before a snapping fire, followed by dinner.

In the dining room was a sight I shall always remember! There on a sheep station in desolate country was an elaborately set table. Over a hand carved antique table was a beautiful pure white linen cloth glistening with sterling silver place settings, crystal goblets, Wedgewood china plates and matching serving dishes. Extending the light of glowing hot embers of the corner fireplace were flickering candles held in silver candelabra that balanced an artistic array of geraniums and leaves as a centerpiece.

As the Australians express it, "the food was beautiful"—vegetable soup, lamb roast, hollandaise sauce on cauliflower, and potatoes. For dessert there were meringues with custard and apricot tarts, and then,

One of the less conspicuous in a whole continent of marsupials, the gray possum is the Australian counterpart of our American possum, like it a tree-dweller.



after dinner coffee in the drawing room around a lingering fire.

Our remarkable hostess who continued to care for us just as royally at every meal did all her own cooking and housework, no small task in a 22-room place—all this besides helping Sandy with the sheep. It was interesting to us that the Andersons always dressed before dinner and afterwards relaxed near the fireplace with a book in hand. Fingering a chain of cigarettes or pipe, Sandy was especially fond of inserting into the conversation, in his Scottish brogue, quotations from Burns.

As though in response to an unspoken query, they explained that they tended to be a bit formal because it was so easy to let go, and so they purposely tried to live as graceful a life as possible in this outback country of New South Wales.

The hospitable Andersons stopped all personal activities that they might make our visit something to remember. At night we would go out into the cold dark to shine torches into the eucalypts and often we saw possums, their two eyes gleaming like live coals. We tried a few pictures of them as they posed, but the majority were too high for our strobe light to be effective. The possums are the only pouched animals—marsupials—native to North and South America. We have the one species in our own country with which we are all familiar.

Each day Sandy would take us in his light truck over trails through the bush in order that we might get a few pictures of wildlife on a sheep station. The biggest thrill was watching red kangaroos which were numerous. Early in the morning and late in the afternoon they would come out from heavy cover into the park-like open places. We spent pleasant hours locating the "mobs of roos" and with camera on tripod set up in the back of Sandy's truck we would try to run alongside to film them as they bounded along. The terrain was usually too bumpy to get a decent picture, but on two occasions when we hit smooth

Most of Australia's smaller cities and towns, like Hay, New South Wales, grew up under Victorian influence. This block of shops is typical.



The Sandy Andersons' Thelangrin Cottage is headquarters of a fifty thousand-acre sheep station and a center of gracious living on the edge of the "outback."



patches of wind-blown sand we experienced the thrill of a lifetime in keeping right alongside the graceful animals.

On our first opportunity there were many in the band. Soon they split up and we confined our attention

to a mother roo and her joey. The youngster was in the lead which made us wonder if it was actually faster on foot. Anyway, they gave us a good chase. Later in the day an old man kangaroo put on a marvelous performance. The pictures in slow motion were made at 64 frames a second and it was not until we saw him on the screen that we could actually tell that the tail did not hit the ground, but instead served as a balance. The front feet were tucked close to the body as the old fellow bounded 15 feet at every jump. His top speed was about 30 miles an hour.

Sometimes we would see families of roos feeding on the saltbush, and we would watch them from a distance with our binoculars. A baby roo, called a joey, would occasionally pop headfirst into its mother's pouch and peek out from the place of protection.

There were many kinds of birds. In one patch of light scrub we saw an old emu, the Australian representative of the ostrich family. He paid no attention to us, but sauntered leisurely away, slowly circled and came back, and then put his head down momentarily. Then I caught a glimpse of a baby emu and I realized this was the old male convoying young. Giving chase, it took all of us to round up just two of the dozen or more fast moving little ones. Their striking design of black and white feathers made it almost impossible to see the downy fellows among the grasses. As with most animals it was only movement that gave them



Sandy Anderson gained a temporary advantage over two reluctant baby emus.

Six thousand long-fleeced merino sheep is par for a fifty thousand-acre station. It takes eight acres to feed one sheep.



away. Sandy told us that the males in the emu family assume quite a responsibility. Father emu incubates the many eggs, from a dozen to eighteen, and after they have hatched he continues to be the guardian of the youngsters.

Western New South Wales is a dry country. A scant rainfall of 10 inches or less a year makes farming almost impossible and so all the 50,000 acres of Thelangrin Station were used for grazing of sheep. Tanks of water pumped by windmills were strategically located over the vast area and there during the heat of the day the domestic animals would congregate. We were surprised to find that the sheep were wary—just like the kangaroos, they would not allow us too close and would move away stirring up a cloud of dust. Sandy had 6,000 merinos, one sheep for about eight acres. He preferred merinos which do

well in a dry country, for too much rain tends to ruin the long staple fleece for which merinos are noted.

At one end of the station we looked into the tremendous sheep barn where during shearing time 1,500 animals could be clipped in a day with a crew of 14 itinerant workers. These men traveled from station to station doing the work by contract at so much a head. During the immediate post-war years the high price of wool brought temporary prosperity to the entire country, but recently times have been more difficult.

Parrots were most conspicuous and colorful and we saw great flocks of many kinds. In the 100-foot eucalypts bordering the Lachlan we saw pairs of ringnecks that apparently were searching for nesting sites. They would go in and out of the holes in gnarled branches of the eucalypts and then fly rapidly to some other likely site. The parrots preferred the forested

Old man kangaroo doing thirty in the open bush.



Emus in dusky silhouette made one of our most striking memory pictures of living along the Lachlan.

areas, while the rosy-breasted cockatoos, known locally as galahs, were most numerous in open places. We often saw these beautiful birds feeding upon seeds on the ground, and when we disturbed them they would rise, swirl away flying in unison, and carry on aerial maneuvers alternately flashing their rosy underparts and their silvery gray backs.

Late one afternoon we came across a mob of these rosy-colored birds at one of the watering troughs. There were so many that they could not all land on the rim of the tank at once. Some waited their turns in the dead branches of a tree nearby. Others lined up along the barbed wire fence or massed among the green leaves of the mallee eucalypts where they looked like animated pink blossoms. Many were so eager for water that they lit on each other's backs at the trough. There was a constant screeching and hubbub, but the galahs paid little attention to us. Dad was in the back of the truck taking movies and I was alongside Sandy who was at the wheel. He would edge the car a little forward and then stop so we could get more pictures. Just when we were near enough for some good close-up shots, I leaned across the wheel, my elbow hit the horn and the blast sent the entire flock into the air.

And so was lost the only opportunity we had for photographing a large concentration of one of the most beautiful of all the parrot tribe.

Late that evening as we were returning over the open flat saltbush plains, Sandy stopped the car and pointed out a band of a dozen or more emus almost black against a wonderful evening sky. There was no chance to stalk them so we sat motionless, and to my surprise, instead of running, the birds began to circle. Sandy started waving his handkerchief and soon the inquisitive emus, apparently wondering what strange business was going on, slowly came our way. When within 75 yards they paused suspiciously. Sandy gave them the come-on treatment, waving his handkerchief again and again until the whole group was within 30 feet, silhouetted dark against the golden light. We scarcely moved and the curious birds continued to mill about and then started to drift away. The car was started and we slowly moved on across the plains and into the dark forests along the Lachlan River to Thelagrinn Cottage where friendly lights welcomed us. The visit to this New South Wales sheep station was a nice climax to our experiences in a wonderful country.



AS THIS ISSUE of *Pacific Discovery* goes to press your columnist will be adjusting himself to a new way of life. For the past eight years he has traveled up and down the State of California in the interests of vector control. If you are not quite sure what a "vector" is, be patient as we are going to take a close look at the subject in a moment. Your columnist's new professional address is the recently established Alameda State College in Hayward, California where he will have the enjoyable assignment of teaching such courses as nature study, ecology, vertebrate zoology, entomology, and perhaps someday vector control.

Although not planned that way, most of this column, then, becomes a parting salute to the Bureau of Vector Control, California Department of Public Health.

A note of caution: do not let the array of vectors and pests overwhelm you and keep you from enjoying fully the out-of-doors. Be thankful that the Bureau of Vector Control has approximately 50 men and women dedicated to safeguarding the public from these hazards but realize that statistically your likelihood of contracting one of these diseases is very slight in comparison say, with your chances of a mishap while traversing the freeway. This may be small consolation to the family of a plague or encephalitis victim but it is the only realistic view possible for you. It is, perhaps, best to be aware of potential hazards where you live or visit and then proceed with common sense. The United States Public Health Service and the California State Department of Public Health will provide leaflets and information concerning these subjects on request.

WATCH FOR—Winter Styles for Young Moths

JANUARY AND FEBRUARY are favored months for finding butterfly and moth pupae. By collecting them and placing them in a terrarium you may provide a dramatic classroom or home demonstration of one of the most fascinating phases of metamorphosis when the adults emerge. Or you may wish to collect them in order to obtain perfect specimens for your collection or duplicates for exchanging with other collectors.

Since there always seems to be a bit of confusion in regard to the terms used for lepidopterous pupae, some clarification may be desirable. The third or resting stage in the life history of all moths and butterflies can correctly be called the *pupa* (plural, *pupae*). A butterfly pupa may also be called a *chrysalid* (plural, *chrysalids*) or a *chrysalis* (plural, *chrysalises*). A *cocoon*, in the strictest sense, is simply a covering of silk, or a mixture of silk and larval hairs, sand, or plant material that encloses an egg mass, larva, pupa, or in some cases an adult insect. However, the term is used most frequently in reference to moth pupae and in actual practice the silken covering plus its enclosed pupa is referred to as a cocoon.

Among the overwintering pupae which may be found most easily in the West are the following:

Native silk moths (Family Saturniidae). Cocoons of the Ceanothus Silk Moth (*Hyalophora euryalus*) may be found attached to small branches of wild lilacs, wild cherry, or California Coffee Berry. This moth is replaced in the Rocky Mountain area by Glover's Silk Moth (*Hyalophora gloveri*), the cocoons of which may be found on currant, gooseberry, maple, willow, elm, or box elder. The Polyphemus Moth (*Antheraea polyphemus*) occurs in suitable localities throughout the country with its cocoons found on a great variety of broadleaved shade, forest, and orchard trees.

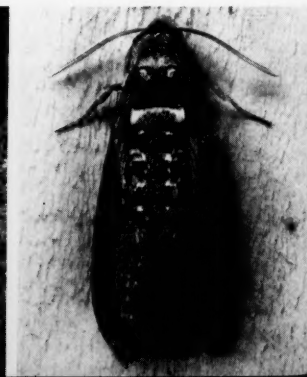
Sphinx moths (Family Sphingidae). The naked pupae of these moths may be found near the larval food plants beneath the surface of the earth at a depth of from one to approximately eight inches. They can be best removed after turning over the soil carefully with a garden fork. Look for pupae of the beautiful Eyed Hawk Moth (*Sphinx cerisyi*) at the base of willow and the Western Poplar Sphinx (*Pachysphinx modesta occidentalis*) near cottonwood, poplar, or willow. The Achemon Sphinx (*Pholus achemon*) may be found near Virginia Creeper or grape vines, the Tomato Sphinx (*Protoparce 5-maculata*) associated with tomato, potato, Tree Tobacco or Jimson Weed. Collecting of sphinx pupae can be especially good if you happen to be on the spot when a farmer ploughs a tomato field or a field alongside a row of willows or poplars.

Tiger moths (Family Arctiidae). The loosely formed hair-and-silk cocoons of the familiar "woolly bears" may be found under boards, stones, and logs, or on fence posts, garden fences, or the walls of buildings. By far the commonest species in most parts of the West is the Acraea Moth (*Estigmene acraea*). The caterpillars feed on a very great variety of plants including most garden flowers and vegetables as well as weeds.

Swallowtail butterflies (Family Papilionidae). One of the most familiar butterflies of this family west of the Rocky Mountains is the Western Tiger Swallowtail (*Papilio rutulus*). The chrysalids may be found attached by silken strands to branches of the larval food plants, alder and willow, or to nearby trees, weed stalks, fence posts or other structures.

All of the moths and butterflies mentioned here will emerge from their pupae as adults in the spring with the exact time dependent upon the temperature and humidity of the place where they are kept. A.C.S.

PHOTOS (LEFT TO RIGHT): Western Tiger Swallowtail, chrysalid, adult (Gayle Pickwell). Tomato Sphinx Moth, pupa, adult (Lester A. Brubaker). Ceanothus Silk Moth, cocoon (Art and Ed Smith). Glover's Silk Moth, adult (Art and Ed Smith). Polyphemus Silk Moth, cocoons (Gayle Pickwell).



Q & A—Fleas, Flies, Bats, Gnats, and Skeeters

THE BUREAU OF VECTOR CONTROL of the California Department of Public Health maintains headquarters in Berkeley with branch offices in Sacramento, Fresno, and Los Angeles. Here are some of the questions most frequently asked of this organization:

QUESTION. *What is a vector?*

ANSWER. According to Webster there are three kinds of vectors, in (1) Astronomy; (2) Mathematics; (3) Biology: "an organism, usually an insect, which carries and transmits disease-causing microorganisms."

A biological vector in the classical sense must conform to Webster's definition. For example, the soft shell tick, *Ornithodoros hermsi*, carries and transmits the spirochetes of tick-borne relapsing fever from chipmunks and squirrels to man. Many ticks, mites, fleas, flies, mosquitoes, and other arthropods play an important role in transmitting diseases from animals to man or to other animals.

In attempting to protect the public from these diseases through the control of vectors it has proven impossible to restrict control to those arthropods actually known to transmit disease. In some cases technical knowledge is still incomplete as to species which do or do not transmit certain diseases in nature. Furthermore, the public is unable to distinguish between "vector" and "pest" mosquitoes, ticks, fleas, flies, gnats, and other animals. The public demands relief from any creature that bites, stings, irritates, or is merely present in or about the home in annoying numbers.

Thus vector control agencies find themselves concerned not only with disease-carrying mosquitoes and flies and other true vectors as well as closely related pest species (in some cases distinguishable only by the expert) but also a great variety of other noxious or annoying animals such as yellow jackets, spiders, scorpions, and rattlesnakes.

RICHARD F. PETERS
Chief, Bureau of Vector Control

QUESTION. *Of what importance is the increasingly frequent discovery of rabies in bats?*

ANSWER. So far, little is understood about bat rabies. To date, 35 bats of seven species have been found positive in California, and many more in other parts of the country. Apparently the infection can be carried by these animals without symptoms. When actually rabid, most bats become paralyzed rather than furious. Thus when humans are exposed it is usually because they handle sick bats. One death in California resulted from such an incident.

There has been no association of rabies in bats with dog rabies. At first it appeared that bats might account for the numerous but scattered outbreaks of the disease in wildlife. However, skunks and foxes prey very little on bats. There has been difficulty in transmitting infection to such animals through bat bites. At least in California, outbreaks in skunks and known rabies in bats have not been correlated.

For the present, bat rabies should probably be regarded as an infection, in a somewhat modified form, that mainly circulates in bat populations. That it occurs to an impor-

tant degree cannot be doubted. If the public can be educated not to handle bats that are sick or behaving peculiarly, probably the hazard will be low. This point remains—tree dwelling species, while hanging in trees by day, are not suspect.

KEITH MURRAY
Vertebrate Ecologist

QUESTION. *How far does a fly fly?*

ANSWER. As far as it has to. Fly dispersal studies, using flies tagged with radioactive P-32, have shown that a few individuals traveled long distances. For example, the House Fly (*Musca domestica*) 20 miles and the Black Blow Fly (*Phormia regina*) 28 miles. However, since individuals congregate in areas or places having suitable (1) food, (2) breeding media, (3) shelter, and (4) water, overall movement of the population is usually 1 to 2 miles for the House Fly and 10 to 15 miles for the Black Blow Fly.

RALPH J. BLACK
Technical Consultant,
Refuse and Organic Waste Disposal

QUESTION. *Do mosquitoes constitute an important public health problem in the Western United States?*

ANSWER. Yes. Malaria and encephalitis are mosquito-borne diseases which may occur in locations where the vector mosquitoes are prevalent, and these are widely distributed in the West. Some recent vector-borne disease outbreaks have occurred as follows: 1952—western equine encephalitis in California, 1952—malaria in Nevada County, California, and 1958—western equine encephalitis in Utah.

Other mosquito species, not known to carry specific human diseases, by their sheer numbers and resultant extreme annoyance cause great mental anguish and severe interference with outdoor work and recreation, as well as annoyance to livestock. Great broods of these pest mosquitoes may be produced by improperly drained agricultural land and infest areas extending for miles in every direction.

Malaria has been at a low level in recent years; but in the days of the Gold Rush, the incidence of malaria was higher than that recorded in most of the Southern States, and significant outbreaks occurred in California through the first quarter of this century. *Anopheles freeborni* and *Anopheles punctipennis* are the two important vectors of malaria in the West. Larvae of *A. freeborni* are found in sunlit pools, the marshy edges of shallow ponds, in fields which remain flooded continuously between irrigations, and most particularly, in rice fields where dense vegetation provides shelter. *A. punctipennis* breeds in shallow water or seepages along sluggish streams and prefers lightly shaded situations. Each species can adjust to many other situations in addition to its preferred habitat.

Arthropod-borne western equine and St. Louis encephalitis are mainly diseases of nature, of which the principal reservoirs are believed to be the resident and migratory wild birds and domestic fowl. Man and horses may become infected, sometimes with fatal results, but they do not





Hoary Bats. (Gayle Pickwell)

serve as sources of infection for mosquitoes. A widely distributed species, *Culex tarsalis*, is considered to be the chief vector of encephalitis in the West. Its larvae are found in a great variety of habitats, including open field pools, irrigation seepages, residual pools in fields, water holding irrigation structures, containers about homes, stock-watering troughs, and ponds. THOMAS D. MULHERN

Technical Consultant in Mosquito Control

QUESTION. What is this flea that I found on my dog?

ANSWER. A Cat Flea. The common flea found on dogs as well as cats in California is the Cat Flea (*Ctenocephalides felis*). Despite its common name the Cat Flea is found on a number of hosts. These include, in addition to cats and dogs, the opossum, raccoon, man, and others. More complaints of flea bites on man have been traced, in our experience, to this species than to the Human Flea (*Pulex irritans*). The Dog Flea (*Ctenocephalides canis*) is similar to the Cat Flea but far less common here.

The abundance of Cat Fleas is dependent upon the proper humidity, temperature, and the presence of suitable hosts. When conditions are favorable, the fleas can become very numerous. The fleas are then found not only on the animal, its bedding and immediate surroundings, but also on lawns, in basements and garages, and in other parts of the home and yard.

BENJAMIN KEH

Medical Entomologist,
Identification and Evaluation Unit

House Fly
(Edward S. Ross)

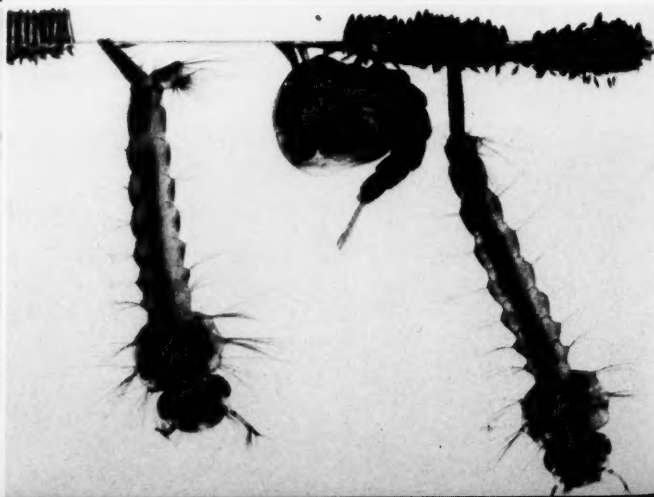
LEFT: Cat Flea.
(Mulhern)

RIGHT: Dog Flea.
(Brubaker)



LEFT: *Culex tarsalis*, adult.

RIGHT: Same,
eggs, larvae,
and pupa.
(E. S. Ross)



THE END OF A DECADE OF 50's

EVERY NEW YEAR holiday season which brings in a "zero" year, a controversy arises over the question of whether or not the world has reached the end of a decade. This year, 1960, columnists are at it again. Should one refer to this as the end of the fifties? Is this the end of a decade? Are we ten years past the mid-century? Or do we still have a year to go?

Actually the questions are not all the same. The answers must be as different as the questions, and we must be sure that we understand what has been asked. Webster defines *decade* as a group or series of ten. It can refer to years, or books, or presumably any set of ten which form a contiguous group. A decade of years does not necessarily have to begin with a year ending in zero or in any other numeral. So 1959 can be said to be the last of a decade of fifties. There can be no doubt that we have run out of years designated as fifties, and we are now entered upon a new series of years we can call the sixties.

Including the word *century* or *mid-century* casts a different light upon the question. By popular use a *century* has come to mean one of a series of hundred-year periods since the beginning of the Christian calendar. Actually the word *century* used alone need not have that connotation at all. It is when we preface it with the word *the* that the idea of hundred-year divisions of the calendar is suggested.

The calendar we use today is but a slight modification of the calendar which began on January first of the year *one*. This date upon which to begin the calendar was established by Dionysius Exiguus, a Scythian monk, in A.D. 533—over five hundred years after the year *one*. Being completely ignorant of the concept of zero, he designated the first year of the new calendar as the year *one*, and the preceeding year as *one* B.C. There should have been the year zero between, and the first year of the new calendar should have been the year zero. The calendar would have been reckoned both forward and backward from January first of the year zero. The idea of zero was introduced by the Arabs in the twelfth century.

It seems strange that this concept was not understood earlier. Certainly when we measure a distance such as a mile or an inch, we do not measure from *one*. When we start out from home in our automobile, we mark a distance of one mile when we are that far from home. We do not start measuring the distance from home with one mile even before we start. Of course one could start with *one*, but he would not be ten miles from home until his speedometer read eleven miles.

Since Dionysius started the calendar with the year *one*, the first decade did not end till the year eleven. The first century ended at the end of the year 100 and the beginning of the year 101. The twentieth century began at the end of the year 1900. The middle of the twentieth century came at the end of 1950—not the *beginning*; and the end of the decade follow-

ing the middle of the century comes at the *end* of 1960—not the *beginning*.

It seems to be general editorial practice to sum up the accomplishments of a passing period. The newspapers always run editorials around the beginning of a new year, recapitulating the events of the year. This year the editors are summing up the events of the fifties. They are suggesting phrases to describe the past ten years. Such phrases catch on better if they are in the form of an alliteration, so we are leaving behind us the "Fabulous Fifties."

In the realm of science the fifties seem fabulous enough as we view them now, but the accomplishments of the fifties will pale by comparison with those editorialized at the end of the sixties. Nevertheless, we have much to be proud of.

When we think of certain fields of science there are certain outstanding accomplishments and development which immediately come to mind. In medicine there was the Salk polio vaccine; in chemistry it has been a decade of wonders in plastics; in physics it will be known as the nuclear decade; in engineering, including applied physics and chemistry, it has been the birth of the rocket age.

If astronomers are called upon to select some grandiose accomplishment for which the period can be famous, most of them will state without much hesitation, "The greatest thing that has happened in astronomy in the last few years is the application of electronic techniques to the study of astronomy."

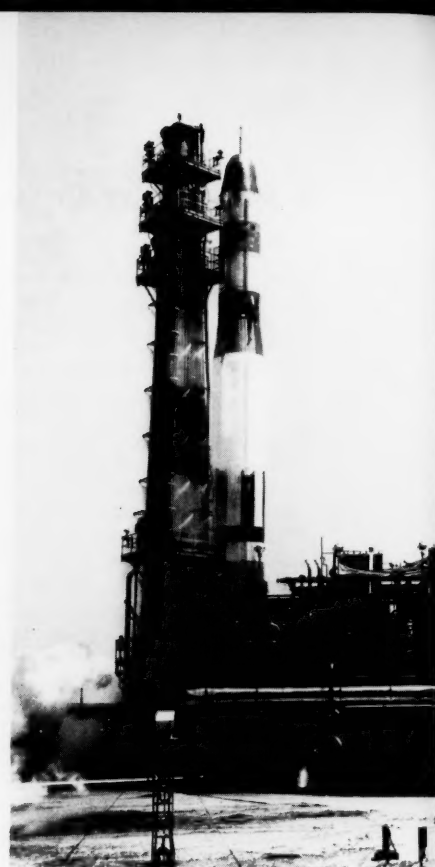
This phase has developed by enormous strides during the fifties. Electronic image devices of several kinds have been developed and are being used to obtain information from faint trickles of light too weak to be usable by conventional methods. *Radio astronomy* was born in 1932 when a young man, Karl Jansky, while studying the direction of arrival of radio static at the Bell Telephone Laboratories in New Jersey, detected radio emanations from the direction of the center of the Milky Way. Not much was done in this field until the late forties, and in the early fifties the discovery of the true nature of the radio emission from the Milky Way spurred research and the construction of huge radio telescopes.

It has long been assumed that our Milky Way is a spiral galaxy similar to many which, lying at great distances in space, can be photographed only by the big telescopes. This could be no more than a reasonable assumption, based upon distributions of stars, their motions in the vicinity of the sun, and upon the logic of the similarity between our galaxy and others. The spiral arms of our galaxy are hidden behind one another and the shape of our galaxy is as difficult to see as the shape of a forest when viewed from within. The radio telescope is capable of penetrating the "galactic haze" to reveal the spiral structure of our Milky Way.

Paradoxically, it is not the great clouds of stars



Things to come:
Full-scale mockup
of a type of missile
engine conceived for
the use of future
space age missions.
Such an engine could
generate between one
and two million
pounds of thrust.
(Aerojet General
Corporation, at the
Sacramento plant)



which form the radiance of the spiral arms that are revealed by the radio telescope, but instead the radio telescope detects the presence of thin, all-pervading clouds of cold hydrogen gas which envelope the star clouds in the spiral arms. It is the material from which stars are born that reveals itself to the radio astronomer.

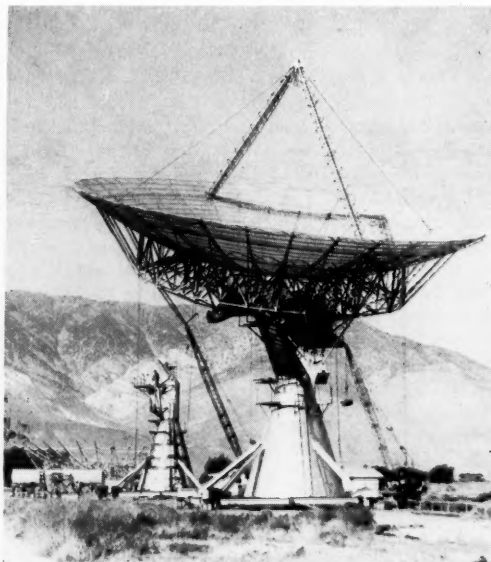
Other exciting applications of the radio telescope include the detection of lightning-like discharges in the atmospheres of other planets, a determination of the temperatures of planetary atmospheres, and the detection of "radio stars" so far away that they cannot be identified by the use of the largest optical telescopes.

The fifties may also be known as the age of preparation for "space astronomy." Satellites and moon probes have been giving us information about the space in the immediate vicinity of the earth. But this is a development of only the last two years of the fifties. The sixties will see space astronomy in unbelievable strides. Plans are being made now for orbiting observatories to send back information by television methods. Serious planning is under way for the establishment of an observatory on the moon. On the last day of 1959 a Russian scientist predicted that within ten years they would successfully conduct a manned expedition to Mars and return with specimens!

By the same standard upon which we base our estimation of the last ten years as the "Fabulous

Fifties," we can begin now to coin a phrase to apply to the coming ten. This department suggests "*The Stupendous Sixties.*"

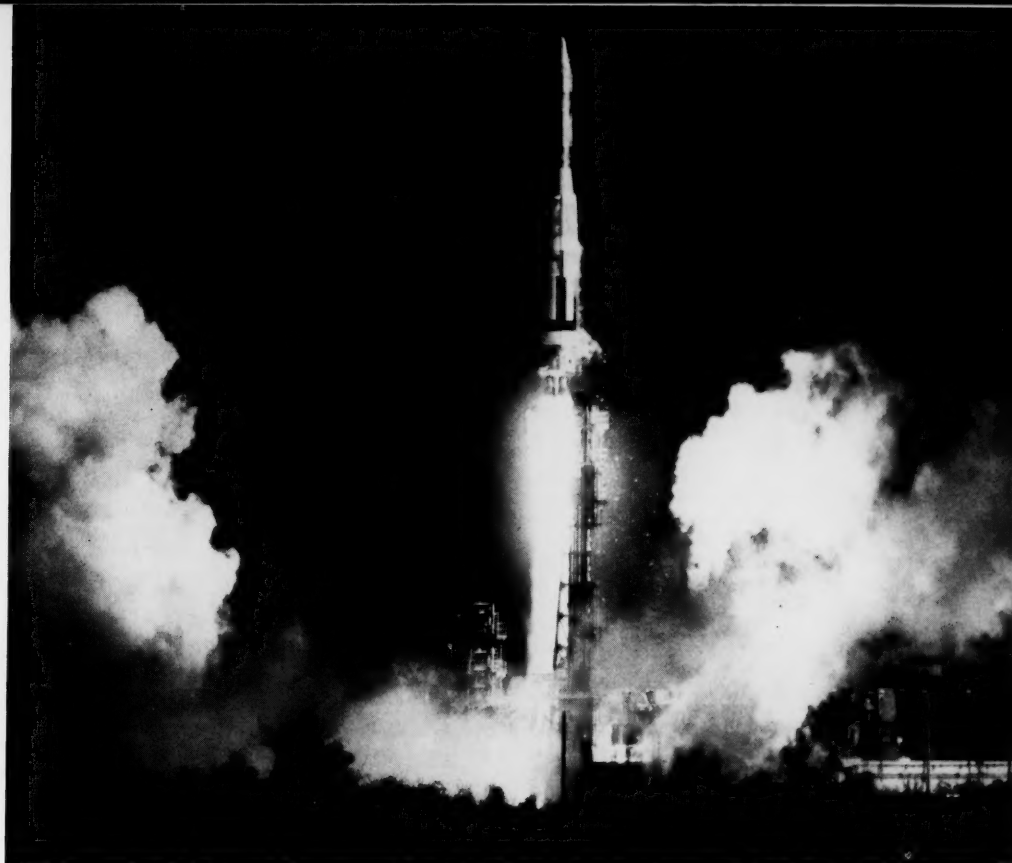
G.W.B.



For larger views and more complete description of Caltech's radio telescope antennae at the observatory in the Owens Valley, see "*To Hear the Heavens Whisper*" by Charles F. Hagar in *Astronomy* for January-February 1959. (California Institute of Technology)

◀ A U.S. Air Force Titan rests on its launching pad at Cape Canaveral, Florida, with but seconds to go before firing, 5 May 1959, and—

➤ Away it goes in the hope of contributing something to the advancement of the "rocket age." (USAF)



SKY DIARY

January, February, March 1960

(Pacific Standard Time)

Phases of the Moon

☾ First Quarter	January 5	10:53 A.M.
☾ Full Moon	13	3:51 P.M.
☾ Last Quarter	21	7:01 A.M.
☾ New Moon	27	10:16 P.M.
☾ First Quarter	February 4	6:27 A.M.
☾ Full Moon	12	9:24 A.M.
☾ Last Quarter	19	3:48 P.M.
☾ New Moon	26	10:24 A.M.
☾ First Quarter	March 5	3:06 A.M.
☾ Full Moon	13	12:26 A.M.
☾ Last Quarter	19	10:41 P.M.
☾ New Moon	26	11:38 P.M.

Eclipses

A total eclipse of the moon occurs on March 12-13 and will be visible generally throughout North and South America. The moon enters the earth's shadow at 10:38 P.M. on March 12 and leaves the shadow at 2:18 A.M. on March 13. The moon is completely within the shadow from 11:41 P.M. March 12 to 1:16 A.M. of March 13.

A partial eclipse of the sun occurs on March 26, but will not be visible in this part of the world. It will be visible in Australia and Antarctica.

The Planets

Mercury: Is best seen in the early morning sky in early January and again in the latter part of March. During both of these ap-

pearances it will be grouped in a line with the other planets to create an interesting "parade of the planets." Between these two periods Mercury will appear as an evening star best visible in the evening sky for a few days around February 24.

Venus: Is a morning object all through the winter months. It will be very bright all through this period ranging from magnitude -3.7 in January to -3.3 in March.

Mars: Rises about an hour before the sun in early January and about two and a half hours before the sun in late March. It is not bright enough to be easily visible until mid February when it rises early enough to be seen in the morning twilight.

Jupiter: Rises about one and a half hours before the sun in early January and more than five hours before the sun in late March. Magnitude -1.3 in January to -1.8 in March.

Saturn: Rises too close to the sun to be seen in early January, but is two hours ahead of the sun in February and four hours ahead in March. Its magnitude through the whole period remains at $+0.8$.

Earth: The earth is nearest the sun on January 4. Spring begins at 6:43 A.M. on March 20.

Events to look for: On the morning of January 21 Venus and Jupiter, the two brightest planets will be close together. Venus will be north of Jupiter by about twice the diameter of the full moon.

On the morning of January 25, the crescent moon will be seen just a little north of Venus and Jupiter. A month later, on February 22, the crescent moon will again be seen close to Jupiter and on the morning of February 24 the moon passes Venus. These conjunctions of the moon with Jupiter and Venus occur again on the mornings of March 20 and 25.

Don't forget the total eclipse of the moon on the night of March 12 and the morning of March 13.

All the naked eye planets will be visible in the morning sky during the last days of March.

(Continued from page 1)

than has been generally recognized. In doing so, he has produced a seamanly story which makes excellent reading, and should become the Vancouver biography in greatest demand, the more so in that the author has so definitively placed his hero in historical context and perspective.

An interesting sidelight chapter, in which our hero La Pérouse figures in *absentia*, recounts Vancouver's search, en route to the Hawaiian Islands (which you recall Cook had found in 1778 and named for the Earl of Sandwich) from California, for the islands called Los Majos (etc.) by Spanish navigators. La Pérouse in 1786 searched diligently for these islands which still persisted on charts, as late as 1793 when Vancouver hunted them, at about 10° longitude east of Hawaii. Not finding them, "La Pérouse suggested that Gaytan, in an expedition sent from Mexico in 1542, had made the first discovery of the Hawaiian Islands." The longitude error can be accounted for by the westerly setting "North Equatorial Current, of which the Spaniards were unaware" as they charted these islands 600 miles (10°) too far east.

This raises the interesting question why, if Spaniards knew these islands (by whatever name), did they not use them as a port of call during the 250-year operation of the Manila Galleon, and brings us to another book:

The Manila Galleon. By William Lytle Schurz. E. P. Dutton & Co., New York. 1959. 453 pp., maps. Paper, \$1.75.

Look at the track chart of the treasure galleons which from 1565 to 1815 plied annually, more and less, between Manila and Acapulco. From Manila, proceeding northeasterly, the little ships, overlaid with China silks and other Oriental trade goods and with passengers, regularly rose to 31°-44° latitude to make their easting with the Japan Current and the prevailing westerlies, finally running the long southeasterly beat down the California coast to Cape San Lucas. This was the hard one, marked over the years by foundering in storms, by the most harrowing hardships of disease and starvation, and taking five to seven months. (In one case, of 400 people who left Manila, 192 landed alive at Acapulco; and the extreme record was racked up by the *San José* of 1656-7 which ghosted past Acapulco more than a year out of Manila, with not a soul alive to bring her in.) Westbound it was a breeze: down to the latitude of Panama, west to Guam and a refreshing stopover; average time, three months. If they knew Hawaii, they could not have made the Islands eastbound; westbound, they did not need the stop so early on, and nearing they would have feared some threat to the silver treasure, from possible island-based pirates. Indeed, the Dampiers, Drakes, Ansons, and Rogerves were one of the chief worries of the Spanish captains.

There is not space to fairly describe and appraise this tremendous little book, the outcome of a quarter century of research. It is as richly laden as the two-million-peso *Santísima Trinidad*, with all the most romantic aspects of history, with the life and times of Manila "the Pearl of the Orient," relations with the Chinese and the Japanese, the intricacies of commerce and colonial government, and above all with the most intimate details of building and loading and sailing and fighting those fabulous ships of a time so close to, yet so incredibly different from our own, in which the Pacific changed from a hazy speculation made real to a "Spanish Lake" to a newly won half of the world for all men. The first Manila Galleon crossed the Pacific 45 years after Magellan; the last, 20 years after Vancouver. This is the story of an era in the Pacific World, which in these pages comes wondrously to life again.

The Troublesome Voyage of Captain Edward Fenton 1582-1583. Narrative & Documents edited by E. G. R. Taylor. Cambridge: Published for the Hakluyt Society at the University Press. 1959. lvii + 333 pp., text figs., maps, 15 halftones. \$6.50.

They weren't all successful, those Elizabethan gentlemen who hoped to live handsomely off the dividends of Spanish merchants. Witness Captain Edward Fenton, who was doubtless inspired by Sir Francis Drake to go forth and do likewise. The presentation of his story here is in a form principally for the study of historians, but it will appeal to early-voyage buffs of strictly amateur standing as well, who can take their "Munday the 21th of maye the wynd somewhat harting yn to y^e northeast, we put owr luckyly (as I trust) into y^e sea, and stopping certain tydes, by thursday folowing, w^{ch} was the ascension day we were gote almost to y^e sterte," straight. Most others, alack, will not get to y^e sterte.

The Voyage of the *Astrolabe*—1840: An English rendering of the journals of Dumont d'Urville and his officers of their visit to New Zealand in 1840, together with some account of Bishop Pompallier and Charles, Baron de Thierry. By Olive Wright. A. H. & A. W. Reed, Wellington. 1955. ix + 180 pp., illustrated. 30s.

The incident of a narrative out of a voyage of Dumont d'Urville some 15 years after his search for La Pérouse, and in a ship of the same name as the one whose story appears in this issue of *PD*, is sufficiently coincident, it seems, to justify the mention of a book, now, which will likely be of more pertinence, later, in connection with other New Zealand matters. It does indeed fit the theme at hand, and is worth looking into for its own sake, and for interest in the ways of the Maori just before their subjection to Europeans.

"Tight little island" in China Sea

A History of Hong Kong. By C. B. Endacott. Oxford University Press, London. 1958. xiii + 322 pp., halftones, maps. 30s.

The visitor who lands at Kai Tak Airfield and is whisked through peninsular Kowloon and ferried across Victoria Harbour to the fabulous free port city rising steeply from the north shore of Hong Kong Island, or who lands from an ocean liner anchored in the roadstead, gives little thought, in the usual rush of the tourist, to the historical background of the British Crown Colony that has hung on for more than a century to this small chunk of the China Coast. Although not written to the fleeting interest of the tourist, *A History of Hong Kong* will provide solid ground for the understanding and appreciation of this strangely exciting place as the visitor finds it.

Hong Kong is the product of British merchants' determination to gain access to China's silks, tea, and other riches, not her territory. Mr. Endacott opens with the situation of the British traders in Canton, from 1833, which led to the Opium War and the cession in 1841 of the 32-square mile island as a base for free commercial enterprise. Mainland Kowloon (3 sq. mi.) was added in 1860; and in 1898 the 391 square miles of the New Territories were leased for 99 years. The bulk of the book is concerned with development and colonial administration in the hundred years preceding Hong Kong's surrender to the Japanese; it deals briefly with postwar matters through 1957, including the peculiar situation created by the Communist succession in China and U. S. support of the Nationalist government.

academically speaking

A MORE FITTING ENDING to the Academy's celebration of the centennial publication of Charles Darwin's *On the Origin of Species* could not have been written. At long last, after years of hoping and wishing and wanting, a first edition of this scientific milestone is now a permanent part of the J. W. Mailliard, Jr., Library collection. Its purchase was made possible by monies from the Susanna Bixby Bryant Memorial Book Fund.

Published originally on November 24, 1859, Darwin's famous work was completely sold out, all 1,250 copies, on the first day of its appearance. Bibliophiles the world over enjoy the fact that the first issue is so completely distinguishable by the error which occurs on page 20, line 11, where some woolgathering proofreader allowed an over-stuffed spelling of "speciees" to pass through one eye and out the other.

Previous to this accessional windfall, the Mailliard Library had in its possession the London edition published by John Murray, dated January 7, 1860, as well as the Appleton Company's first American edition, also published in 1860. These, to the purist, however, would not be enough. The ultimate dream has now been realized.

The Academy's gold-embossed, green cloth volume is now proudly displayed in the Library, where it may be admired but not touched without special dispensation from a very pleased Veronica Sexton, Academy Librarian.

THE NATIONAL SCIENCE FOUNDATION has awarded a grant in the amount of \$18,000 to the Department of Geology to be used over a period of three years in a detailed study of the siliceous microfossils, especially diatoms, of a section of the late Tertiary of California. The work will be performed under the supervision of the Department's Curator, Dr. G. Dallas Hanna, whose Research Assistant for the project will be Mr. W. W. Wornardt. Mr. Wornardt is a graduate student in paleontology at the University of California under Dr. Robert M. Kleinpell.

This study has definite application in the fields of general geology, petroleum geology, water resources, and oceanography, as well as with industries using filtration processes.

TWO WRITERS for the Academy's perennial prizewinner, "Science in Action," are making themselves felt in other precincts. Clare Luhman of Sacramento, California, who makes a career of free-lance scripts, has sold a television play entitled "The Blonde Maria" to Station KRMA-TV, in Denver, in a country-wide competition. Kenneth Lamott, staff writer with three novels already to his credit, sold a second piece to the New Yorker magazine which was published in late 1959. Mr. Lamott also has placed a script with the Lorretta Young TV show.

"Science in Action's" free-lance policy of calling upon science writers who are specialists in various fields is giving additional stature to an already sizeable project. Dan Wilkes of the University of California is preparing an upcoming show on anti-matter, and Marjorie Hunt, who is a

Even though working largely from colonial government sources, Mr. Endacott has produced a vigorous and objective chapter to the general history of the Far Western edge of the Pacific World. It is obvious that British occupation of Hong Kong has given that small mountainous island on the China Coast a world-importance it would not otherwise have had.

D.G.K.

medical writer at the same institution, has done several programs for "S in A." Nick Lafkas, who wrote the script for "The Story of Jade," which will be aired on January 25th, is a teacher in the Daly City High School system.

Mr. and Mrs. Benjamin Draper often work in tandem in the preparation of scripts and are planning a southern California safari to procure background information on two future telecasts. They will visit Cal Tech, Scripps Institution, World Life Institute, and two southern campuses of the University of California.

FURTHER HONORS have come to the Academy's Director, Dr. Robert C. Miller. At the December meeting of the American Association for the Advancement of Science held in Chicago, Dr. Miller was elected President-Elect of the *Academy Conference*, an organization made up of forty-four academies of science in the United States and Canada. Dr. Miller will serve as President-Elect in 1960, President in 1961, and Chairman of the Board of Directors in 1962.

H. R.



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